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THE NATURE-STUDY REVIEW

DEVOTED TO ALL PHASES OF NATURE-STUDY IN SCHOOLS

OFFICIAL ORGAN OF

AMERICAN NATURE-STUDY SOCIETY

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THE
NATURE-STUDY REVIEW

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FIRST MEETING OF AMERICAN NATURE-STUDY SOCIETY

Report of the Secretary

The first meeting of the American Nature-Study Society was held at the University of Chicago on January 2, 1908. Professor L. H. Bailey, chairman of the Organizing Committee, was unable to be present and the Committee appointed Professor Otis W. Caldwell, of the University of Chicago, vice-chairman.

The first hour was devoted to hearing (1) the report of the Organizing Committee, which is given below, (2) to discussion of various points in the proposed constitution, leading to some changes and finally to adoption by unanimous vote; and (3) election of officers for 1908. The suggestion made in the December REVIEW that final vote be taken by mail was deemed impracticable by all members present and by many who had written their suggestions. It seemed highly desirable that the first meeting should be followed by the announcement of completed organization.

Following the transaction of business, a series of short papers opened discussion of the topic, "Should Nature-Study be differentiated from Science Teaching?" This topic was selected because so many men of science have questioned whether there is a distinct field for the new society. The result of the discussion was satisfactory, for near the close of the meeting there was evidently agreement that, however much those entering the discussion disagreed on minor points, nature-study adapted to young children differs from the science of higher schools sufficiently to warrant the name "nature-study," at least as a matter of great convenience in handling the educational problems of the most elementary studies of nature. The papers read and abstracts of the discussion will be printed in THE REVIEW as rapidly as space allows.

The following persons took part in the reading of papers and in the discussion: Professor C. R. Mann, of the University of Chicago; Professor Stanley Coulter, of Purdue University, Lafayette, Ind.; Professor C. F. Hodge, of Clark University, Worcester, Mass.; Professor M. A. Bigelow, of Teachers College, Columbia University, New York City; Professor F. L. Charles, of the DeKalb (Ill.) State Normal School; Professor F. L. Clements, of the University of Minnesota; Mr. W. W. Whitney, of the South Chicago High School; Professor S. B. McCready, of the Ontario Agricultural College, Guelph, Ontario; Professor John G. Coulter, of the Normal (Ill.) State Normal School; Professor W. E. Praeger, of the Kalamazoo (Mich.) College; Professor W. D. Merrel, of the University of Rochester (N. Y.); Miss Louise Klein Miller, Supervisor of School-Gardens, Cleveland, Ohio; Mr. J. H. Smith, of the Chicago High School; Dr. Katherine Dopp, of Chicago; Professor J. H. Shepherd, of the Chicago Normal School; Mr. I. B. Meyers, of the School of Education, University of Chicago; Professor O. W. Caldwell, of the University of Chicago. It is quite possible that the secretary may have ommitted names of others, for in the last hour the speakers followed each other in rapid succession and at times there was difficulty in getting names.

Report of the Organizing Committee

The first definite move towards the organization of a national society for study and advancement of nature-study was the editorial in THE NATURE-STUDY REVIEW for March 1907 (Vol. 3, p. 68) in which it was proposed that all readers who would join in organizing such a society should send their names to the editor of THE REVIEW.

The hearty responses from readers in the first month following publication of the plan proposed for a national society seemed to justify definite movement towards organization, and the details were placed in the hands of the Organizing Committee. This committee was appointed by the majority vote of prospective members who followed the suggestion in the March REVIEW and sent lists of names nominated for the committee. The following accepted and have cooperated in the work of organization: C. F. Hodge, L. H. Bailey, O. W. Caldwell, Stanley Coulter, H. W. Fairbanks, V. L. Kellogg, Anna B. Comstock, D. Lange, M. F.

Guyer, F. L. Stevens, W. Lochhead, M. A. Bigelow, C. R. Mann, E. F. Bigelow, J. F. Woodhull, and Alice R. Northrop. The Organizing Committee elected L. H. Bailey, chairman, and M. A. Bigelow, secretary.

The work of the Organizing Committee has consisted chiefly in circulating information concerning the proposed society, in drafting a constitution, and in appointing a nominating sub-committee. In the two latter duties the committee has been guided closely by the suggestions made in the March REVIEW, because numerous letters indicated that the plan of organization there proposed in general outlines would be most acceptable. In making nominations the sub-committee has depended almost entirely upon the suggestions from many persons whose influence, local and national, made their recommendations valuable.

Officers for 1908

The following officers were elected by unanimous vote:

President—L. H. Bailey, Cornell University.

Vice-Presidents—C. F. Hodge, Clark University; F. L. Stevens, N. C. College of Agriculture; V. L. Kellogg, Stanford University; W. Lochhead, Macdonald College, Quebec; F. L. Charles, DeKalb (Ill.) Normal School.

Secretary-Treasurer—M. A. Bigelow, Teachers College, Columbia University.

Directors—(for two years) D. J. Crosby, U. S. Department of Agriculture; C. R. Mann, University of Chicago; S. Coulter, Purdue University; H. W. Fairbanks, Berkeley, California; M. F. Guyer, University of Cincinnati; (for one year) O. W. Caldwell, University of Chicago; G. H. Trafton, Passaic, N. J.; F. L. Clements, University of Minnesota; Ruth Marshall, University of Nebraska; E. R. Downing, Marquette (Mich.) Normal School.

A glance at the list above will make it clear that the officers elected for this year represent a wide range in geographical territory, educational institutions, and lines of science and education. Of course, there are many others who "ought to have been on the list of officers." The Secretary can easily name more than 50 people who ought to be in the list of officers and most of whom will probably be officers within five years; certainly so if advice from several members of the present council

continues to have weight. In the meantime there will be abundant opportunity for present officers and other members to demonstrate by efficient activity their right to be official representatives of the American Nature-Study Society.

Interest of Men of Science in the Nature-Study Society

The organizing meeting held at the University of Chicago has been pronounced a great success by many prominent educators and scientific men who were present; and the great interest in the work of the Society shown at the organizing meeting and in many informal meetings of the members of the various scientific societies makes it certain that the new society will have hearty support.

Never before has nature-study been discussed so much within a short time as during the four days at Chicago. It was a very popular topic for conversation. Many scientific men asked for specific information concerning nature-study, to which their serious attention was for the first time attracted. The presidental address, by Professor McMurrich of Toronto, before the American Society of Naturalists contained a strong plea for better nature-study in schools. In short, it was evident that interest in nature-study was in the ascendancy so far as men of science are concerned. Here is a most important point, for many of these men have long been inclined to regard nature-study as merely a fad.

All this does not mean that the scientific men are now heartily approving nature-study in general—good, bad, indifferent, and sentimental. On the contrary expressions of approval were commonly coupled with qualifying remarks concerning the kind of nature-study. Especially was there hearty approval for the attitude of the American Nature-Study Society as shown in Article I of the Constitution; and there was approval for the stand of THE NATURE-STUDY REVIEW for conservative and scientific study of nature-study problems.

CONSTITUTION OF THE AMERICAN NATURE-STUDY SOCIETY

[Editor's Note—.The Constitution as adopted is printed below. The chief changes made in the Constitution as proposed in the December issue of The Review are as follows: (1) A slight change in wording of Article I, (2) Omission of reference to fellows and honorary members (3) Provision for life members and patrons, (4) Twenty-five votes necessary for independent nominations, (5) In Article VI substitution of section for branch, (6) In Article VII, reading October in place of June.]

ARTICLE I—NAME AND OBJECTS

The objects of the American Nature-Study Society are, by publications and by national and local meetings: (1) to promote critical investigation of all phases of nature-study (as distinguished from technical science) in schools, especially all studies of nature in elementary schools; and (2) to work for the establishment in schools of such nature-study as has been demonstrated valuable and practicable for elementary education.

ARTICLE II—MEMBERS AND FEES

Any person interested in any phase of nature-study or elementary science may become a member upon election by the Council. A school or library may be enrolled as a member, and be represented at meetings by one of its officers.

There shall be no admission fee. The annual dues shall be one dollar, payable before February first, or upon election to membership. The official publications of the Society shall be sent without charge to members not in arrears for dues. Members residing outside of the United States shall pay the necessary foreign postage on publications mailed. The name of any member two years in arrears for annual dues shall be omitted from the list of members, but may be restored by payment of arrearages or by re-election.

ARTICLE III—PATRONS AND LIFE MEMBERS

Members paying twenty dollars at one time shall be enrolled as life members exempt from annual dues. Any person paying to

the Society one hundred dollars shall be permanently enrolled as a patron and entitled to all the privileges of members. All monies collected from life members and patrons shall, under direction of the Council, be invested as a permanent fund and only the income used for expenses of the Society.

ARTICLE IV—OFFICERS

1. The officers shall be a President, five Vice-Presidents, a Secretary-Treasurer, Editor (when the Society assumes financial control of an official journal), ten Directors elected by general vote of the Society, and additional Directors elected by sectional organizations as provided for in Article VI. The President, Vice-Presidents and Secretary-Treasurer shall constitute an Executive Committee for the transaction of routine business authorized by the Council. All the officers together shall constitute a Council with the following duties: Consider and report to the Society all business proposed for a general vote and manage the business of the Society according to the constitution and by-laws. The term of office for the President and Vice-Presidents shall be one year, for the Secretary-Treasurer and Editor two years and for the Directors two years (five of the first Directors shall be elected for one year, and five for two years).

2. Elections of officers. The Council shall make nominations for all offices and publish them in the official journal before November fifteenth of each year. Members and fellows shall have the right to suggest nominations by mail, and any name thus receiving at least twenty-five votes before October fifteenth shall be published with the nominations by the Council. The annual election shall be held in the last week of December, at a stated meeting if such is ordered by the Council to be held at that time; otherwise by ballots mailed to the Secretary. Members unable to attend any meeting of the Society shall have the right to mail their ballot to the Secretary. All ballots mailed must reach the Secretary before December twentieth, in order to be counted at the annual election. A majority of the ballots voted by mail and in person shall be sufficient for election.

Any section of the Society, as provided for in Article VI, consisting of more than one hundred members may elect a delegate to serve two years as a Director in the Council of the Society.

In case of vacancies the Council shall appoint officers for unexpired terms.

ARTICLE V—OFFICIAL PUBLICATIONS

All official communications approved for publication by the Council shall be published in THE NATURE-STUDY REVIEW, which shall be sent free of charge (except foreign postage) to all members whose annual dues have been paid. This journal shall continue to be published privately and on the personal responsibility, financial and editorial, of its editor or editors, until the annual income of the Society justifies the Council in assuming the management and publication as the official organ of the Society.[1] Until such official management, the Secretary-Treasurer of the Society shall, before February first of each year, pay to the editor the estimated cost (not to exceed eighty cents and foreign postage) of annual subscription for each member whose dues have been paid, provided that the editor contracts to return at the end of the year any unexpended balance to the Treasurer of the Society.[2]

The members of the Council shall serve as an advisory Editorial Committee for THE NATURE-STUDY REVIEW.

ARTICLE VI—SECTIONS OF THE SOCIETY

Members of the Society in any city, state, group of states, or Canadian province may, with the approval of the Council, organize sections. Any Section with more than one hundred members may elect a delegate to serve as a Director of the Society for two years.

ARTICLE VII—AMENDMENTS

Amendments to this Constitution recommended by the Council and published in the official journal before October first of any year may be adopted by a two-thirds vote of members voting in person or by mail at the annual election in December.

1[It is probable that the financial condition of the Society will justify this move within six months—SECRETARY.]

2[After discussion this was agreed upon as most satisfactory for present purposes without in any way involving the Society financially before the annual income can be safely estimated. The present legal owner and editor has agreed to transfer THE REVIEW to the Society free of all indebtedness whenever the Council votes to assume the management and in the meantime to carry out the publisher's side of the arrangement given above.—SECRETARY.]

FUTURE WORK FOR THE SOCIETY

The foregoing report on the first meeting is encouraging, but a word of warning may prove valuable. Those interested in developing the American Nature-Study Society *must guard against a lapse of interest. There must be no reaction.* Organizing and adopting a constitution and electing officers is simply a beginning of work which should enlist every member in some way. Naturally the work of leading is assigned to the officers who constitute the Council. They invite suggestions from all members of the Society. What are the important lines of activity which should be undertaken?

As suggestions of lines of desirable activity we may now mention (1) work of Sections of the Society, and (2) studies of committees assigned to special problems.

The Constitution provides for local Sections. A meeting to organize a New York City Section will be held at Teachers College on January 18th. Members of the Society in other cities and in certain States are planning for similar local sections. They are important and absolutely necessary in order to organize the work in the schools. The annual national meetings will be important for study of general principles, but the test comes in application to the schools. Local sections can best reach the schools, and so it is quite important that officers and all other members should interest themselves in developing the work of the Society.

Plans for the appointment of some committees will soon be submitted to the Council of the Society. Such special phases of the nature-study problems as physical nature-study, school-gardens, agricultural nature-study, relation of nature-study to high-school science, and relation of nature-study to geography will probably be assigned to committees. The Secretary will gladly transmit suggestions in this line from members to the Council.

Increase in Membership Needed

The membership list is rapidly approaching the one thousand mark which was set for a beginning. In order to carry on the

work which ought to be done the Society needs 2000 members before October and a little extra effort on the part of present members will soon result in rapid increase of the enrollment. Articles I and II of the Constitution ought to attract the interest of all persons who believe in scientific education. In order that present members may be able to suggest new names for membership the directory of members will be prepared as soon as the list has one thousand names. Application blanks, briefly stating the aims of the Society and conditions of membership, will soon be ready for distribution to members who wish to enclose such slips in their letters and pamphlets.

Notice Concerning Fees and Membership

The annual dues are payable before February first, or upon election to membership. To avoid expense for clerical work a money order or a dollar bill should be sent with each application for membership, and postal-card receipts will be sent by the Secretary-Treasurer. Members already enrolled should use the subscription blanks enclosed in this magazine, giving name, address, and the words "Member A. N.-S. S., 1908 dues." In this way the great waste of labor and postage involved in sending personal bills will be saved. The date on the address-label of the wrapper should read 12–08 if you paid your dues for this year more than one month ago. A star before the date indicates membership in the Society; and if it is not present on the label for January and February issues, notify the Secretary in order that your name may appear in the directory to be printed. Subscriptions to THE REVIEW are not recorded as membership unless accompanied by applications for membership. If subscriptions for 1908 have been paid through agencies, applications for membership in the Society should be accompanied by 20 cents in stamps or money order. Members are requested to read the notices relating to the Society and to THE REVIEW, on the second and fourth cover-pages of this issue.

THE RELATION OF NATURE-STUDY AND SCIENCE TEACHING

[EDITOR'S NOTE.—This is a series of discussions in answer to the question, "Should nature-study for elementary schools be differentiated from science for higher schools?", presented at the first meeting of the American Nature-Study Society, January 2, 1908. It is evident that upon the answer to this question will depend the outlining of the field of work for the new Society. The practical conclusions to be drawn from a summary of all the discussions are that: (1) In method nature-study for young pupils must resemble in an elementary way that of more advanced science. (2) In selection of materials differentiation is advisable but not fundamentally necessary. (3) In organization of facts to be taught there is a fundamental difference in that nature-study must keep close to everyday life and neglect the technical aspect, that is, the characteristic scientific organization of science in the strict sense. (4) There is obviously a tendency towards setting a somewhat arbitrary limit to the most important field of nature-study in the late years of the grammar school near the borderland of the high school; but there is at the same time a strong tendency towards applying the nature-study point of view to high-school science. Obvious with such conceptions of nature-study the field of the new Society is primarily that of studies of nature in elementary schools; but also there is a point of contact with high-school science, and possibly with the so-called popular nature-study for those adults who prefer to know things from the nature-study point of view as distinguished from the technical science point of view.]

I

By STANLEY COULTER
Purdue University, Lafayette, Ind.

To those of us who have dealt with nature-study from a practical, rather than from an academic viewpoint, it has seemed a long journey through the stage of definition-mongering and material-peddling to the present conception of its significance and recognition of its pedagogic value. It is very doubtful, indeed, if any modern educational movement has been so hampered by definition, so obstructed by material, so deflected by sentimentalism. It is an evidence of the vital quality of the movement that, in spite of these obstacles, it has not been entirely driven from the schools, but has on the contrary gained a firm foot-hold in many educational centers.

It is at present a matter of substantially unanimous agreement that nature-study is not a subject with fixed and definite material

involved, such as botany or zoology, but that it stands as the rather unfortunate name of an educational device or tool through which it is sought to accomplish very definite results. It is regarded as a movement to relate education to daily life, to make education a part of life instead of something apart from life. It seeks to accomplish this end by a wise training of the senses, using for its material the natural objects or phenomena surrounding the child. This training of the external organs of relation if properly done, involves a knowledge of the development of the child-mind in order that the successive steps may follow in a perfectly natural and, therefore, perfectly logical sequence. Some of these steps may be indicated as follows:— perception of things; continued perception; perception of kinship; of relationship to surroundings; of parts to their functions; of protective devices; of economic relations. Evidently different educational values are involved in these groupings and their proper arrangement and emphasis does much to determine the educative results of nature-study work. It is plain that a clear-cut conception of the significance of the pedagogic steps involved is of infinitely more importance than even a fairly wide range of knowledge of material suitable for nature-study work. Indeed, it is evident that the intellectual end, the pedagogic result, can be reached by the use of the most varied material; that the material in a certain sense is but an incident, the intellectual end supreme; not only can varied material be used, but it must be used if nature-study reaches its true educative values.

The daily life of a boy is not altogether related to birds and flowers, it may at certain points at least, touch cattle and vegetables. In other words the material should be as varied as the surroundings demand. But training in seeing things definitely and clearly, in seeing them in relation to each other and their surroundings, in seeing them in their economic relations, this can be secured by the use of any one of a hundred material objects, provided, always provided, that the object is in some way related to the daily life of the child. A teacher in Brooklyn once wrote asking advice as to how to present the "blue bird" to her school in which not one of the pupils had ever seen a blue bird. Not the least of her difficulties lay in the fact that the blue bird was to serve as nature-study material for an entire month. Of

course such work was not nature-study, neither was it science; it was merely a sign of educational imbecility, a disease by no means confined to a single locality.

All of which goes to show that nature-study is not a definite and specific body of knowledge, but an attitude of mind; that its results are in no wise to be measured in terms of accumulated facts, but in an attitude of mind in the presence of facts. The thought that nature-study is a body of knowledge has done very much to retard its advance, very much more to confuse a matter which is, after all is said, extremely simple. If nature-study is merely the name for a device for securing a symmetrical intellectual development through a wise training of the senses by the use of environmental material, then the notion so widely prevalent that nature-study necessarily means birds and flowers and insects and trees is an erroneous one. If it were true, nature-study would be practically impossible in the congested districts of our great cities or could at best be but imperfectly presented. It is difficult, however, for one to see why the habits of life, the food-gathering and food-storing, the architecture and activities of the animal known as man should not furnish material as valuable and interesting as do other animals.

It is extremely doubtful whether nature-study in narrow connotation of the past and of far too many schools at present is of any value at all commensurate with the time given to it in the schedule. On the other hand it is obvious that work which closely relates the daily life and the school life, which uses the objects and phenomena of the environment as educational material has a value so high that it can scarcely be overestimated. These values can be secured only through the orderly and logically progressive training of the senses—the external organs of relation; by at least keeping functional these powers upon the strength, rapidity and precision of which so much of self-reliance and initiative ultimately depend.

It goes without saying that the great bulk of nature-study work of the future as in the past will be done with plants and animals as the material; that in some cases it will be even narrowed to useful plants and animals in the name of agriculture in the schools, but any attempt to organize the plant studies so as to present even the grosser, salient points of botany or to so organize the studies of useful plants and animals that, by a sum-

mation there may be gained a science of agriculture however elementary, is to remove the work from the category of nature-study and place it in the group of memory-studies.

Nature-study deals with the materials of science, but from a different viewpoint and with a different purpose. Its primary viewpoint is the attitude of interest on the part of the child in its surroundings; the purpose, growing out of that viewpoint to increase this interest, to broaden it, to deepen and to make it educative. By a series of small intellectual conquests it seeks to awaken a permanent enthusiasm for greater conquests. By awakening a sense of power in gaining knowledge through the senses, to stimulate an exercise of that power in a constantly increasing degree. Out of such work one may expect to see naturally developed a sympathetic and responsive relation with nature; through it there should come a great enrichment of life because of multiplied points of contact with nature. These purposes are luminous before those who grasp the real significance of the movement and make any and all material available for the work.

With such a varied material, a material necessarily determined partly by the surrounding and partly by the aptitude of the teacher, it is evident that uniformity of work, as the phase is understood in educational circles, is impossible. Every attempt to make uniform courses in nature-study has but resulted in the introduction of elementary science of a very feeble and tenuous sort. Such courses do exist, however, and nature-study is compelled to bear the burden of the pedagogic absurdity. The craze for uniformity more than any other one thing has led to the great success of our schools in the development of mediocrity. Uniformity looms so large before the eyes of the average school authorities that power, self-reliance, initiative, enthusiasm, all seem pathologic symptoms demanding vigorous and heroic treatment. Nature-study has been prevented from coming to its own because of this irrational demand for uniform courses of study, uniform material and uniform methods.

The objection may be made, as it has been made, that such a conception of nature-study leads to scattering and unrelated work. It is urged that if the subject is really one of high value, that some material or some method of universal application should certainly be found. It must, however, be remembered

that in nature-study the purpose is not the accumulation of facts, it is the development of power or an attitude of mind. This remains true, however, that the facts clearly and definitely perceived are the very ones that are clearly and definitely related and that those which have become a part of the furniture of the mind by right of conquest by the senses, constitute the raw material of subsequent acts of reason and judgment. Power is not exhausted in order to accumulate facts. Facts are used that power may be developed. If one wishes to climb a mountain he may choose any one of many paths with absolute confidence that if persistently followed it will lead him to the summit. The path he chooses may be determined because of the side of the mountain on which he finds himself, or because it is hard or because it is easy, but whatever the determinative factor of the choice, *the path leads to the summit.* It is so in the development of power in the external senses; anyone of many materials may be chosen with the absolute certainty that it will lead to the summit of power if it be persistently followed. The uniformity lies in the result, not in the methods by which the result is reached. The uniformity lies in the attitude of mind, not in the material used to induce that attitude.

The net results sought in nature-study may be summarized somewhat as follows: The development of: (1) the external senses to a high degree of rapidity and precision; (2) an attitude of close and sympathetic relationship with nature in her varied manifestations; (3) an avidity for further knowledge through conquest by the senses; (4) a sturdy self-reliance born out of first-hand knowledge.

Science concerns itself with a definite body of knowledge and the laws which may have been deduced from that body of knowledge. These laws it seeks to verify or disprove, to broaden or limit by new facts, by more critical and recondite observations. Its assumption is that the pupil possesses power for the mastery of the subject. This means a mastery of the facts themselves, of their relations and of the deductions drawn from them. The primary purpose is the mastery of the facts. What power is possessed is of course increased by its exercise; but this is an incident of the work, not its purpose. This purpose is the mastery of a body of facts definitely organized and referred so far as our knowledge permits to laws of greater or less comprehensiveness.

A series of independent, non-related lessons bearing upon natural objects or phenomena is neither science nor nature-study. For real science work there is no place in the lower grades of the secondary schools, a statement which should go without argument. Any attempt to relate the methods of nature-study and science is to the detriment of both.

Nature-study should not attempt to present the material with which it deals in scientifically organized form. By this is meant, if we instance the case of plants, that the material selected for the work need not be such as to cover even the chapter headings of a modern text-book in botany. Nor should the tests of efficient work in nature-study be the same as those which might be properly used in science. The fact in nature-study, or, if you please, the observation should always be subordinate to the power which it was employed to develop.

Nevertheless there is a very real and a very natural relation existing between nature-study and work in science. The foundations for work in natural science are: the trained eye which sees clearly, swiftly and with certitude, and the eager mind keenly alive to all of the manifestations of nature. Upon such foundations real science work is possible, without them it is too often the barren-waste, so sadly evidenced by many of our doctors of philosophy, who after writing their theses for the doctorate have been absolutely non-productive. From the alert and eager senses comes knowledge so complete and of such clarity that accurate and comprehensive generalizations inevitable follow. From the attitude of interest springs the permanent enthusiasm which makes research work possible, for only from a fine enthusiasm can be born the ability to toil terribly and patiently until the goal is reached. Nature-study properly administered develops the intellectual muscles used in science work and trains them to a swift yet certain functioning.

Incidentally, the facts of nature-study are the facts of science. We appreciate a law as we are able to refer to it the facts within our knowledge. The greater the number of facts we can so refer, the more comprehensive and significant does the law appear. The work in nature-study serves to furnish a large series of such facts which, in due time take their proper place in the syntheses of science vitalizing the work of both the lecture room and laboratory.

Much of the so-called work in nature-study should be regarded as wholly without the educational pale, it is without form and void. The pedagogy, the real intellectual significance has been lost in material and method. In secondary schools and universities alike each day sees intellects drowned in the great flood of facts of our complex age. It is necessary to hark back to first principles and to answer a few simple questions. What is the underlying educational purpose in nature-study? In what terms are its results to be expressed? What is the purpose sought in science teaching? In what terms are its results to be expressed?

The attempt has been to show that in the case in hand the purposes and methods of the subjects are widely different. If this contention is true, the similarity of material, even the identity of the material, ought not to lead us to the inference that the subjects are interchangeable or that they possess some necessary relation which a wise administration would emphasize.

The relation between true nature-study and true science work is perfectly simple and perfectly natural: It is the reflex influence of work well done in an elementary subject upon the work done in another subject which is more recondite and more intellectually exacting.

II

By C. F. HODGE
Clark University

The organization of this Society is timely and opportune. I take it to be the natural and spontaneous next-step in the evolution of a sane elementary science teaching which has been developing in the public mind and has taken a definite trend toward what we now call nature-study for nearly thirty years past. This meeting thus marks a natural epoch in American nature-study, and I especially wish to express my approval of Article I of our Constitution: "Critical investigation," "establishment in schools of such nature-study as has been demonstrated valuable and practicable for elementary education" here expressed, as the purpose of our Society is exactly what the present needs.

I have been called to scores of places to try to answer the question of earnest teachers, as usually expressed, "what is the matter with our nature-study?" My many written attempts

to answer this question, with which some of you are familiar must excuse me this afternoon for passing over this fundamental subject with but a single word. The "matter" with nature-study, as I find it everywhere in schools and in books and courses, lies at the bottom in the lack of vital relation between the subject-matter selected and the life of the child and the home or community. I cannot endure any of this talk, some of which we have heard here today, that "material is incidental." "Teach anything you are interested in, fellow teachers, one thing is just as good as another." A leader in some section of the country begins to preach this doctrine, and I am certain to hear the Macedonian cry: "Come over and help us."

The truth is we are face to face with the deepest problem in education, the problem of feeding the human soul and mind during the period of its active growth. It is the time when the child's philosophy of life must be built into its organization by the subject-matter and methods of its education. This philosophy of life must unite the child with its race and make it fit to take a place in the social order. Hence it is not sufficient to say that subject-matter selected must be of interest to the individual child. The course must go deeper than that and embody the fundamental and universal interests of the social organization. Some courses of nature-study have brought vividly to my mind the picture of feeding a baby "water-worn pebbles" with a spoon. As well, yes, even better, say, gravel, "sow-thistles and brambles" are as good as milk to feed babies on, as to say that one thing is as good as another for nature-study. We must all realize, when we think seriously about it, that there are a few things which every man, woman and child in a civilized community ought to learn for dear life, and that there are thousands of other things which it makes little difference whether the majority of good people ever hear about at all. To discover what those things are in the natural environment which condition the health and happiness of the individual, the wholesomeness and beauty of the home, the efficiency of each to do his or her part for the best good of the whole is, I take it, the function of this organization.

Our attention has been directed to possible distinctions between science and nature-study. I am in full accord with the carefully prepared paper of our Secretary that classified and

arranged knowledge, worked over from the point of view of logical and exhaustive presentation of subject-matter, so essential to college and university courses, has no place in nature-study. Still I also wish to second Professor Mann's position that there is no essential difference between science and nature-study; that science in essence throughout is "problem solving." This is Lessing's definition of science as: "The everlasting struggle of the human mind after truth." To arouse and inspire the child to try to solve problems, to struggle for the truth, not dead Gradgrind, Mr. Choakumchild loading of the memory is the prime factor of good science or nature-study instruction. Here again, as it seems to me, the inspiration to work, the motive force which impels the child to strive, is the feeling that the truth sought is worth the effort.

Froebel has pointed out the wonderful progress of the child during its first three years of life. Nowhere do we find deeper suggestions for nature-study than here. Even the way a young animal learns is illuminating to our problems. A partridge chick in its first active day tries hundreds, if not thousands, of experiments, pecks at all sorts of conspicuous objects, pecks at the eye of a fellow, gets no satisfaction, pecks at a dew-drop, learns how water tastes, pecks at its own toes, and tips itself over, at its fellows' toes and tips them over, is served likewise in its term, learns that toes are not food. It learns that some things taste good and other things bad and by the end of the day has solved the fundamental food problems of the species. If some students of education could give us from this point of view a detailed picture of even this first day in the life of a bird, it might awaken us to appreciate more keenly the possibilities of early education.

Touching as it does the whole people, and occupying these plastic years of youth, there can be no doubt that nature-study in the public schools is the most fundamental and most vital problem in the whole field of modern science instruction. Here we must answer the question (as Dr. Coulter puts it); How may we keep the "tentacles of enquiry" of the young child alive between the kindergarten and high-school or college age? We might say: How can we keep the children alive mentally and morally and prevent them from becoming parasitic word-eaters? If any university specialist in science or education deems this problem too low or easy for his powers, let him join this Society

and tackle it for a while. The farther I go, the more it is born in upon me that our exigency is grave, and that science teachers and specialists of every grade must get together and all put their shoulders to the wheel. For such united effort this Society now affords an adequate, working organization, in which, I hope, teachers in primary and grammar grades, high-schools, normal schools, colleges and universities may unite on absolutely equal footing.

Sir William Macdonald is now devoting his time and his millions to elementary, rural scientific education. Some years ago he began by endowing scientific research in McGill University. I had long wished to ask him why he had turned from university research to elementary science, and, being at his house in Montreal recently, I surprised him with the question. His eyes twinkled as he replied: "The younger the better, the younger the better. If science is worth anything, the younger we teach it the better. Yes," he continued, "I did begin with science in the University, and I have no fault to find with that; but I soon realized that if we made science mean anything much to the whole people, we must begin with the boys and girls. The Catholic Church is the wisest organization in the world and it says: "Give me a child till he is twelve, and you may do with him what you please after that? We ought to be as wise for science."

Fellow teachers in science, how do we meet such a test as this? Where is the body of method and matter upon which we agree as well and teach as patiently and successfully for science as do our Catholic friends for religion? From what an incubus of ignorance and all its consequent folly and misery would this free us as a people—preventable disease and invalidism, patent and quack medicines, faith cures and unchristian science, and, we might add, if everyone knew enough to do his part, preventable insect ravages due largely to ignorant destruction of birds and other insectivorous animals.

When we consider how fundamental and how universally needed this elementary struggle for truth is, we must admit that all our endowments for higher science, great as they are, and all our expenditure for public education, large as this is, are inadequate to cope with the present situation. We need, as we need nothing else, on our side of the line, some man of wealth who

has the faith in the possibilities of elementary science that Mr. Macdonald has for Canada. And with the Macdonald Consolidated Schools, the Macdonald Institute at Guelph, and the Macdonald College at Ste. Anne de Bellevue, all working together in demonstrating good methods and results and in training teachers, Canada will outstrip us in this great work. We need at least one Macdonald Institute in each State, and we need decent nature-study facilities, equipment, laboratories and dignified courses in nature-study in all our normal schools. These courses should not be exclusively college science, which can result in nothing better than futile attempts at teaching college sciences in the public schools, they should be such practical "problem solving" as will strengthen, inspire and prepare for teaching nature-study.

Much interest has been awakened by the establishment of the Sage Foundation for the investigation of the causes of poverty in this country. What larger and more widely disseminated causes of poverty can we hope to discover than our tax for preventable disease (about $3,000,000,000 annually), our bills (unestimated) for patent medicines, our tax for insect damages ($800,000,000 a year), our forest-product famine and the devastating floods and fires on account of national ignorance of forestry, our ruinous soil impoverishment, our wanton destruction of bird life, and many other drains on our national prosperity equally unnecessary. Here are problems which lie sclose to the life of the child and the home, problems of wholesome homes and clean living, problems of birds and insects, gardens, fields and woods and pure water. These are problems which meet the criterion of basal and universal human interest which its must be the function of a system of public education to begin to solve. May our organization be the means of hastening and establishing the good work.

III*

By C. R. MANN
The University of Chicago

In launching this new organization for the promotion of the interests of nature-study in the elementary schools, it is important to define as clearly and as definitely as is possible the

*Abstract of Professor Mann's address.

exact purpose or aim of the society; and this resolves itself into a discovery of the fundamental principles of the subject, and of the place of nature-study in schools. In other words, we must first know what nature-study is for. Until the problem before us can be stated accurately and specifically, the efforts of the society will accomplish little; since it will be, as it were, shooting at random, with small chance of hitting the mark. In the hope of assisting in this definition of the aims of nature-study, the following two working hypotheses are suggested as guides in the future work.

The attempt is often made to draw a sharp line of distinction between nature-study and that which usually passes under the name of science in the high schools and colleges. Is this distinction real, or has it been forced on nature-study as a sort of protection against the inroads of the later so-called science? This is the first fundamental question.

This question cannot be answered until we agree on a definition of what we mean by science; and upon the nature of the definition accepted will depend the answer to the question. The most universally accepted definition of science is this: "Science is organized knowledge;" yet while this definition has much to commend it, it is barren of results for the purposes of education, since it points to no clue, either explicitly or implicitly, to the motive that impels men to scientific work. Besides, it does not tell the teachers anything about the aims of science in the course, nor does it give any indications of the manner in which science should be presented in order to obtain the highest educational results. On the contrary it is frequently considered to contain by implication a justification for teaching science as a series of organized facts, to be committed to memory without any conception of the methods used in the organization of those facts. Hence this definition will not prove of assistance in the present connection.

A much more vital and useful definition for the purposes of education is this: "Science is problem-solving." This definition is very rich with suggestion both as to the motive that impels to scientific investigation, and as to the ways and means of carrying on the work; for anyone who is able to solve a problem must be able to recognize the motive in the curiosity aroused by the problem, and to analyze ,with thought, the mental

processes involved in the operation of obtaining the solution; and when this has been done, and the operation has become clear, he will be in a position to understand how to present science to children. This definition also implies several other points which are vital to nature-study; as, for example, this: that the problem must be spontaneous with the child,—must be the child's own problem,—or, in other words, must be real to him in order that his curiosity be keenly aroused. If this is to be the case, the problem must arise naturally out of the child's own concrete experiences, so that the materials of the problem must be connected closely in some way with the child's life. Furthermore the answer must not be given him, and he must not be dogmatically corrected if his first solution seem to the teacher to be wide of the mark; but he must be directed to further evidence, and thus trained in the most precious habit of weighing evidence and verifying conclusions.

This definition of science as problem-solving is not only rich in implications for the teacher, but it also furnishes a very satisfactory answer to the problem of the distinction between nature-study and science. In the light of this definition we see that there is and should be no essential difference between them. In the elementary school the child solves his real problems, but these are of a simple and more concrete kind; as he proceeds, and acquires power in the art, his problems become more complex and more abstract; until, in the graduate school, under the name of research, he is working at very complex and very abstract problems,—problems on the borderland of human knowledge,—but with no essential difference in the spirit and the methods of the work. This is the ideal condition, the one towards which, let us hope, we are moving. In this condition there will be no distinction of kind between nature-study and science, but only one of degree. This condition is far from the practice of the present time. We now have the true scientific investigating spirit only in the elementary science and in the research work. The intermediate work, extending, say, from the seventh grade through the college, although devised presumably to prepare for research, is too often actually carried on by dogmatically cramming the memory with "facts and laws," with a total neglect of motive and a consequent deadening of the research spirit.

But while this definition, or one like it, helps in defining the aims of the nature-study work, it by no means furnishes all the information needed by the teacher. We need a further working hypothesis to guide in the selection of problems for the successive grades, and to tell us the use of the solutions of the problems when they have been obtained. For science is not mere skill in solving problems; but the facts learned in the process, and the organized knowledge obtained from the work have an added value of their own. Is there any suggestion that may guide us in defining this side of the problem?

The following, drawn from a study of the history of science, is suggested as possibly defining the greatest use of the results of scientific work to mankind, and hence also as defining the ultimate use of this scientific knowledge to the individual. This use does not lie in the increased physical comfort of life, which is often ascribed to science; nor yet is this greatest service of science to be found in our greater control of the forces of nature. These are but the external signs of the results of the problem-solving of science. The real use of these results of scientific work is that of furnishing the mind with a concrete, ordered basis for abstract, organized thought. The concrete pictures of system, order, and organization, which result from the scientific study of natural phenomena, are necessary to order, system, and organization in the worlds of the intellect and the soul. Were the natural world a physical chaos, the mind would be a mental chaos, and the soul an ethical chaos. The fact that the modern soul is somewhat of an ethical chaos is thus in part the reproach of modern science teaching.

This conception of the use of scientific knowledge may be illustrated by many, many examples. Perhaps the most striking is that of the establishment of the Copernican system of astronomy. This piece of scientific work may be said to be encumbered with a minimum amount of practical use; but its use, as furnishing a concrete picture of a system of order, organized about a central body, which is the life of the whole, has performed services of inestimable value in revolutionizing religious concepts, —in fact, we may believe that the complete consummation of the Reformation would have been impossible without it.

The idea underlying this conception of the use of scientific work is very similar to that on which Froebel bases his mother

play and kindergarten games; since these are given to the child to furnish him, through his own personal experiences in living them, with concrete pictures of relations which he is to meet in his later life; thus preparing the way for a real comprehension of those relations, and an appreciation of their actuality. Much of the unreality and the emptiness of modern, religious, organized life is doubtless due to the failure of science to have stored the mind of the modern man with suitable concrete pictures of law and order during his early education.

Hence, in closing, let me urge this newly-born society to define its purpose clearly and with precision, and to take suitable account of the two fundamental principles here set forth. "Science is problem-solving." "The results of scientific work should furnish the mind with a real, ordered, concrete basis for real, organized, abstract thought." These are, for the cohorts of science, the two hands of Moses; and so long as we hold these aloft, we need not fear, in any struggle we may be called upon to enter, lest Israel will not prevail.

This Nature-Study Society, therefore, has before it a research problem in education to be solved by the methods of science. It should enter the work in true scientific spirit; should inaugurate experiments to test its working hypotheses; should modify these hypotheses, if necessary, by the results of its experiments; and so should endeavor to organize a unified course of scientific instruction, extending from the kindergarten to the graduate school,—a course that would preserve as its most valuable asset the research spirit in the students, and would at the same time fill the mind of every one of them with such clear and powerful pictures of the organization and the law-abiding system of Nature that intellectual and ethical chaos would no longer be possible.

In conclusion it, must be noted that the organization of the science work as here set forth carries with it the solution of the problem of the adequate preparation of the teacher. For if the science work from the kindergarten on is so conducted as to preserve the research spirit, all that will be required of a teacher will be that he take enough work in science to have mastered his subject-matter to a sufficient degree.

NEW YORK CITY SECTION OF A. N. S. S.

A meeting was held at Teachers College, New York, January 18, 1908, in response to a call issued by Mr. M. A. Bigelow, secretary of the American Nature-Study Society, for the purpose of forming a New York Section of the national society.

Dr. H. A. Kelly, of the Ethical Culture School, was chosen chairman; and Mr. F. L. Holtz, of the Brooklyn Training School, secretary for the meeting.

Dr. Bigelow then reported concerning the recent organization of the American Nature-Study Society at Chicago. He explained the constitution, organization, method of election and the official organ of publication. Dr. Bigelow then explained the purposes of the meeting: To get enough members to form a local Section of the national Society; to carry on practical local work in nature-study; to discuss local adaptation of the general principles of nature-study teaching; to meet the problems of teaching nature-study in a large city.

The matter was then put before the meeting for general discussion. Mrs. Northrop, of Yonkers, urged the formation of such a Section and spoke of the way in which it could be of practical service to teachers in the public schools, e. g., by furnishing nature-study materials, and also it might help to prevent the destruction of wild flowers and park plants, etc. Dr. Call, of the DeWitt Clinton High School, also favored the formation of a Section. He urged that the grade teachers should be aided, and that they especially should be enlisted. Dr. Bigelow said that anyone who was a member of the national society may be considered a member of the local section, if organized, and that as there were already 75 such members in New York City and vicinity, it would be simplest to proceed directly with the election of an executive committee and a secretary to arrange programs and outline work for the Section. He, therefore, moved that such a committee and secretary be elected and that this Section apply to the Council for recognition as the New York City Section of the American Nature-Study Society. The motion was seconded and carried. A nominating committee was appointed

by the chair which reported the nomination of the following executive committee: Mrs. A. R. Northrop, Secretary; Mr. H. G. Parsons, Dr. G. Straubenmuller, Dr. H. A. Kelly, Mr. F. L. Holtz, Mrs. Howard Van Sinderen. The report of the committee was adopted and the persons named were declared elected. It was decided by vote that the time of meetings should be in the evening. It was suggested that the Section meet three or four times a year.

In later discussion of work for the New York Section, Mr. F. L. Holtz, of the Brooklyn Training School for Teachers, suggested that the meetings be devoted to the discussion of the pedagogy of nature-study as well as to the presentation of subject-matter of use or interest to grade teachers. He believed that the Section could be instrumental in inducing park boards, museums and the school authorities to furnish nature-study material to the teachers of the public schools. He said that the Section could also stimulate school principals and other officials to take more interest in nature-study. He suggested that the Section might arrange nature-study excursions. He hoped that the Section would try to get practical results in the schools.

Mr. Spencer, of the New York Aquarium, said that the school authorities expected their teachers to make bricks without straw when they did not provide material with which to teach nature-study. He spoke of the work the Aquarium had done in assisting teachers to secure marine material.

Mr. Parsons, of the Children's School Farm, DeWitt Clinton Park, also spoke of the difficulty teachers had in securing material and said the School Farm stood ready to assist in this respect.

Dr. Kelly referred to the help that might be secured from the Aquarium, the Museum of Natural History, the Botanical Gardens, etc.

Miss Maud Staber, Brooklyn Training School for Teachers, said the Section could assist teachers by making lists of available materials and also showing good localities for field study.

Mr. C. H. Robison urged the formation of standing committees to look after different interests represented in nature-study. This was left for the executive committee to work out.

There were about thirty-five members of the A. N.-S. S. in attendance. The following interests were represented: Teachers College, Ethical Culture School, Brooklyn Training School for

Teachers, New York Training School for Teachers, Children's School Farm, the Public Education Association, New York Aquarium, DeWitt Clinton High School, High School of Commerce, St. Agatha School of New York, and several public schools of New York and neighboring cities.

F. L. Holtz, Sec. Pro Tem.

THE NATURALIST'S OUTLOOK AND SCHOOL NATURE-STUDY

By EDWARD F. BIGELOW, Stamford, Connecticut

One of the best sentences ever published in The Nature-Study Review, the most expressive, the fullest of truth—mighty solemn truth, is this from the article on "Booming Nature-Study," on page 260 of the issue for December, 1907:

"We who are naturalists in vocation or avocation must remember that, after all, naturalists represent comparatively a rare variety of the human genus, and our own outlook on the world may be quite unintelligible to a large majority of our intelligent fellow men."

Will our nature-study specialists please take that fact into their mental laboratories and dissect it, and tell the whys and wherefores of it? In the word of the great philosopher who inquired, "Where are we at?", please explain what we are "at" that will change the situation (so well described in the excellent quoted sentence) a generation from now. Is it desirable that it should be changed? If not, why not?

In the same number was a notice of my book, "The Spirit of Nature-Study," in which the reviewer says, "Most chapters of the book have no particular bearing on *school* nature-study." Will some one please explain wherein "the spirit" of school nature-study (I do not mean materials or methods) is different from that of the amateur naturalists, different from that we would like to see all men and women possess; but that, as the editor of The Review so truly says, they do not now possess.

In all this nature-study talk, do we not limit it too much to children and schools? Will we ever achieve our aims by so sharply setting off a "school nature-study" from "our intelligent fellow

men" who regard us as "unintelligible?"—possibly as harmless lunatics or hopeless idiots, I venture to add.

EDWARD F. BIGELOW.

Office of the
Agassiz Association,
Stamford, Conn.

ARE CHILDREN NATURALLY NATURALISTS?

A Series of Letters from Readers

I

By CLAYTON F. PALMER

State Normal School, Los Angeles, Calif.

The article in the November number with the title, "Are Children Naturally Naturalists?" appeals to me as being peculiarly frank. And now we may find ourselves wondering why this view has not been more generally voiced before. But I suspect that as biologists we have been over-zealous of the importance of biological subject-matter, and perhaps a bit fearful lest the physical sciences have an opportunity competitively to show what they can accomplish in the elementary school nature-study work. Many of us, I believe, must accept Professor Bigelow's contention; and doubtless some of us find in his article an expression of a truth that has been haunting us for some time; and yet, for one reason or another, we had not reached the point where we were ready to confess our convictions.

That now and then a naturalist is "born and not made," no one can doubt; but that many naturalists, if not most of them, were *made*, may not meet with general admission at first. And while each of us probably shows somewhere in the warp or woof of his nature a stronger or weaker tendency in certain directions, is it not true that one may find a considerable and real interest in any one of several vocations or avocations, should circumstances conspire to acquaint him with the essentials of the same?

Is a child naturally fond of animals? How many children are ever given the opportunity to indicate their natural attitude towards animals sufficiently to enable us to answer this question? Most young children, at least, show a natural interest in dogs, cats and other animals, seen at a distance. It is apparently the activity, however, that attracts them, just as a mechanical toy might hold their interest for a time But when these pets are

brought near, they almost invariably frighten, at first, and a further acquaintance is forced by *teaching* the child to *like* the "nice doggie" or "pretty kitty."

It would appear that it is exceedingly difficult to arrive at anything like a safe conclusion as to what a child would naturally do in these and many other cases. The human animal is trained continually from the day of its birth. Is it not another case of, "How much is hereditary, and how much is due to environment?"

My own experience as a boy coincides pretty well with that related by Professor Bigelow, and I believe he has shown us the average, active, healthy boy—the "typical" boy—but there are some puzzling things about this boy nature. Most of us, as boys, probably went through that stage, which may be characterized for the average boy by warfare against the harmless and defenseless "critters" of the earth, air, and water. And I would say that little of it could be classed as intentional cruelty; at least, the sufferings of our "enemies" were not long drawn out according to the nature of the high art practiced by "Tabby" with her unfortunate mouse.

But how can one explain such an outcropping of the savage nature in a boy? Cruelty cannot answer for all this, for as we well know, many just such boys have their pets for whose comfort and care they are very solicitous. It seems to me that most of it is due to the innate tendency in mankind to subdue and subjugate all things possible; for, is he not to have "dominion. . . over every living thing that moveth upon the earth?" Most of these boyhood "sports" are the result of misdirected "dominion;" the boy loves and cares for the useful, and dispatches the useless, according to his understanding. To correct such pernicious "sport" as killing toads and robbing bird's nests, it will be found that the average boy will usually respond to wise effort directed towards showing him his true relation to his environment. Moreover, this should be one of the leading objects in teaching the zoological side of nature-study.

[EDITOR'S NOTE.—Other letters in this series will appear in later issues.]

II

By WILLARD N. CLUTE
Editor of American Botanist, Joliet, Ill.

It looks to me as if your remarks on the query as to children being naturally naturalists are about right. I never heard of anybody that collected more than I did when a boy, but I see now that my collections were made to beat the other fellows. All our long tramps for specimens were not taken for the knowledge to be gained, but for the specimens to be exhibited. I do not recall spending much time with these collections by myself.

I question whether many of the adults who claim to be interested in nature are really so. How many do you know that are enough interested in nature to prefer the study of it to other things? How many who study nature by themselves and bring home no specimens? Mighty few, I'll warrant! I have been trying for seven years to get our people to take a real interest in plants by publishing all the curious and remarkable things about them that I can find in books, the periodicals and the field; but to very small avail. Meanwhile Dana's "How to Know the Wild Flowers," which guides one to the names of his specimens, has sold 65,000 copies. How many of our students of botany do you suppose keep up the study after they leave high school? Not many.

Possibly some such ruminations as these caused nature-study to be dubbed a "fad" by that Chicago professor. It seems to me that if nature-study is ever to get anywhere, it will have to be used as a drill in observation not as a stimulus to the child's interest in nature for which most children have no abiding interest. The child is very much like an electric motor. It keeps going and interested as long as you turn on the current. All this in the face of the fact that in our high school we have a club of 50 ex-botany students managed exclusively by themselves.

As you can see by the rambling nature of the foregoing, it was not written for publication.

CONFERENCE ON AGRICULTURAL EDUCATION

At the meeting of the Department of Superintendence of the National Education Association in Washington, D. C., February

25–26–27, considerable attention will be given to agricultural education. A Round Table Conference will be held at which will be discussed among other things "Cooperation between the State Agricultural College and the State Normal School in Training Teachers for Elementary Agriculture" and "Cooperation between the U. S. Department of Agriculture and State School Authorities in promoting Agriculture in the Public Schools."

Arrangements have also been completed to organize at the February meeting a "Department of Rural and Agricultural Education" coordinate with other departments of the National Education Association. Permission to organize this Department was given by the Board of Directors at the meeting in Los Angeles in July, 1907.

U. S. Department of Agriculture. D. J. Crosby.

EDITORIAL NOTES

The last number of The Review, the end of the third volume, has led many readers to write letters offering congratulations to the editor, who takes this opportunity of dividing the honors with the members of the editorial committee and the dozens of contributors and advisors whose co-operation has made The Review successful educationally. Anyone who has carefully read all the articles printed in the twenty-four numbers since January, 1905, must recognize that the combined work of the many contributors has made a splendid record of nature-study as it has been developing in recent years. In short, the magazine has been true to the prospectus issued in 1904 which announced that "there will be timely notes and reviews on important new literature relating to all phases of nature-study, news notes, short articles and notes on the materials and methods involved in the practical side of the teacher's work, queries and answers, and correspondence and discussions. In brief, it will be attempted to keep readers in touch with the latest and best of theory and practice in nature-study."

The organization of the American Nature-Study Society and the adoption of The Review as the official organ makes the future of the journal assured. The co-operation which has made the journal successful will surely lead to far better results in the work of the new nature-study society. Individual ownership

and control, made necessary by the financial problems to be solved, have in some cases worked against THE REVIEW and support has sometimes been withheld because it was essentially a private journal. Such an objection can no longer obtain, and complete cooperation is to be expected.

According to the constitution of the A. N.-S. S., the Council of the Society will hereafter be the advisory editorial committee in place of the original committee. The editor takes this opportunity to express his appreciation of the help and encouragement which, in the founding of THE REVIEW and in the editorial work on the three volumes published, has been given by his colleagues of the original editorial committee: Professor Bailey, Professor Hodge, Dr. Fairbanks, and Professor Woodhull.

M. A. B.

It has proved impossible to publish in this issue all the papers and discussions presented at the first meeting of the American Nature-Study Society; and the fourth paper, by M. A. Bigelow, and the discussions by many members will be published in the February issue, which will be mailed next week.

The attempt to begin the fourth volume with a full report of the meeting of the A. N. S. S. has led to an unexpected delay in publication. This issue should have been mailed in the third week of January, but it was impossible for the editor to get all the manuscripts before January 16th. It seems certain that the printer will be able to mail the February and later issues in the months of date.

A series of special issues edited by members of the A. N. S. S. are being prepared for publication. The March number is contributed by Ohio teachers, and edited by Professor Guyer, of Cincinnati; and the May number will be edited by Dr. Fairbanks, of California. Six other specially edited numbers are in preparation for next autumn and winter.

The managing editor asks for suggestions regarding topics which deserve special attention, especially on practical lines. We must have more practical material for teachers.

THE
NATURE-STUDY REVIEW

DEVOTED TO ALL PHASES OF NATURE-STUDY IN SCHOOLS

VOL. 4 FEBRUARY, 1908 NO. 2

THE RELATION OF SCIENCE AND NATURE-STUDY

[EDITOR'S NOTE. The following is the conclusion of the report of the first meeting of the American Nature-Study Society which was begun in the January issue of this magazine.]

IV

By MAURICE A. BIGELOW
Teachers College, Columbia University

It has been well said by one of the foremost leaders of the American nature-study movement that "Nature-study is a revolt from the teaching of mere science in the elementary grades." For many years the leaders of the movement have been demanding that lines be drawn between nature-study for elementary schools and science for higher schools; and within recent years it has come to be generally recognized by very many educators that the best nature-study for the primary and grammar grades is that which is differentiated from the *existing* science teaching in high schools. Nature-study then stands for a reaction from science teaching as we commonly understand science teaching. Nature-study is simply the result of looking at elementary-school problems from the standpoint of educational principles rather than from that of science in the strict sense, and the recognition that the prevailing science teaching of the higher schools is utterly unsuitable for young children of the elementary schools.

Such, in brief outline, are the causes of the movement away from the prevailing science teaching of higher schools and to the establishment of nature-study as something differing from science teaching sufficiently to warrant the introduction of the new name for elementary studies of natural things. To understand the nature-study movement and to view logically and conservatively the problems of coordination, correlation or differentiation between nature-study and science teaching, we must first

be clear as to the characteristics of the two phases of study of natural objects and processes which we now commonly call nature-study in elementary schools and natural science in higher schools.

In the first place we must clearly recognize that nature-study and science teaching *can not be two fundamentally different things*. Each deals with natural objects and processes and the approved method of teaching has its basis in direct observation. Obviously there can be but two possible differences between nature-study and natural science teaching, namely: (1) point of view and (2) elementary versus advanced study. Are these apparently slight differences of great significance in scientific education? We can best answer this question by contrasting in careful analysis nature-study and science teaching.

Viewing critically the best existing theory and practice of nature-study in elementary schools, it seems clear that the following are essentials[1] in nature study: (1) direct observation as a basis of study, (2) study of common things of nature, and (3) from the standpoint of our human interests in nature as it touches our daily life directly. Putting these three together, I am glad to define nature-study as primarily the simple observational study of common, natural objects and processes for the sake of personal acquaintance with the things which appeal to human interests directly.

As we pass to the science side of the problem, let us keep in mind for comparison the three striking characteristics of nature-study: (1) observation, the fundamental method; (2) common things in nature, the important materials; (3) human interests in every-day life, the point of view.

Before contrasting nature-study with science, let me make the prefatory note that until the last paragraphs of this paper I shall speak of natural science from the standpoint of the investigator, the scientist, the man whose primary interest in study of nature lies in the attempt to increase little by little the already vast organization of knowledge concerning nature. For my present purposes I shall define and discuss science from this point of view of the strict scientist; and this is legitimate because it is the dominating point of view in our colleges and decidedly influences the science teaching of most high schools. At

[1]See this journal, Vol. 3, No. 1, Jan. 1907.

the close of the paper I shall express agreement with Professor Mann and other science teachers who, in recent years, have begun to question whether the point of view of science in the strict sense should control introductory science courses in high schools, or perhaps even in colleges.

What then do we understand by the term science? Is it merely study of nature? Is a boy chasing butterflies engaged in studying the science of zoology? Is a child testing the wonders of a magnet studying the science of physics? Or is the cook who observes the reaction between water and baking powder necessarily a student of chemistry? Obviously, "study of nature" is not sufficient to define our conception of modern science. But here is a definition which has proved satisfactory: "Science is organized knowledge concerning nature." Classification of facts and organization into principles or generalizations—this is the characteristic, the spirit and the aim of all modern science.[1]

One of the striking proofs of this is the fact that so many times during the reading of scientific papers in the meetings of the last few days we have seen that the interest manifested by the members of the scientific societies has largely depended upon whether the author of a paper succeeded in organizing his own results and connecting them with the established principles of science.

Organization, then, is the great central thought in modern scientific research and advanced study. It was organization which led from the old alchemy to the modern chemistry with its center in the atomic theory; and it was organization, beginning with the facts within the domains of anatomy, taxonomy, paleontology and physiology, that finally culminated in the great central evolution theory that transformed the old natural history, which literally claimed to be nothing more than a record of observed facts, into the modern science of zoology. Likewise the history of all modern science is a continuous story of known facts being organized into generalizations which in turn have stimulated the search for more facts leading to more organization.

Now thus far we have looked at science from the scientist's point of view. But what shall be the teacher's point of view?

[1] See this journal, Vol. 1, No. 1, Jan. 1905, p. 14. Also note in the preceding paper by Dr. Mann, and approved by Dr. Hodge, the definition of science teaching given is based on what it should be ("problem solving"), not on what it usually is.

A large proportion of the college scientists who teach as well as investigate have made their scientist's point of view their teaching point of view. In other words, they have organized their courses with the apparent aim of training special investigators and not in the direct interests of the great mass of students who want knowledge of science for liberal culture.

Likewise in the secondary-school field the scientist's point of view has largely prevailed, chiefly because the college men have through advice, example and entrance requirements controlled, and have attempted to make the high-school science lead directly to the science in the college.

We see, then, that in both high school and college the scientist's point of view usually controls the science teaching. In other words: Science study and teaching is the close analytical, synthetical study of natural objects and processes primarily for the purpose of knowing and understanding the organized principles or generalizations which constitute the foundations of modern science. An examination of the majority of text-books, laboratory guides and lecture note-books will show the truth of this statement.

Contrasting nature-study and science teaching in the light of the above analysis, here are the essential points; (1) the materials for study may be the same; (2) the method of study is the same except in degree of advancement; but (3) the point of view is radically different. Nature-study stands primarily for every-day human interest. Science study, as commonly understood, stands primarily for scientific principles; and while every-day human interest is not necessarily eliminated, as a matter of fact it is certainly not prominent. At any rate, the one important thing in the above contrast is that nature-study cuts loose from the principles, the organization of science, and leaves these for the later work of high school or college.

At this point I fear my hearers may raise serious objections because I apparently advocate that nature-study should be entirely unorganized, that there should be no continuity of lessons, no building up of larger ideas, no principles. Unfortunately much of the nature-study of the past has been that and even worse; but there is something better available. Nature-study may be quite independent of scientific organization, but still have an educational organization. Let me illustrate: In

teaching the science of botany we take up higher plants in some such order as root, stem, leaf, flower and fruit. Why? Because, for the sake of scientific organization, we must compare stem with stems, and leaf with leaves. It is even very probable that for the sake of intense comparative study we will at times ask students to study many roots or many leaves entirely apart from their natural relations and without regard to interest not directly derived from organized knowledge of the science of botany.

On the other hand, in nature-study the point of approach should be radically different. It must be from the child's center of interest. Imagine the absurdity of studying a rose plant in full bloom by first making a comparative study of roots, perhaps even going back to seeds, then stems and leaves, and finally get to the one point of intense interest, the flower. Science study from the standpoint of the scientist may (I believe not necessarily) start with the most uninteresting parts; but nature-study must be true to its claims for interest in daily life and start with the point of greatest interest. Nature-study must study the rose from the standpoint of life as it exists in the child standing before the plant, not from the viewpoint of the man of science who looks through the eyes of the thousands of investigators whose united labors have given the scientist's outlook. No order of comparative botany will suffice for nature-study. The child does not care for the scientific conception of root, stem, leaf, etc. But each plant has a center of interest —the flower in the rose, the root of a radish, the leaf of a lettuce, the fruit of a peach, the stem of an asparagus, —such may be the variations in human interest which decides the point of approach in nature-study.

So also in animal nature-study. The tail of a fish is interesting because significant; but not so is a cat's tail which may be "conspicuously absent" without affecting seriously the life of the animal. In all cases the animal nature-study should start with the most striking habits, uses, and adaptations—these are the centers of interest,—and never mind the comparative zoology of "head, thorax, abdomen, appendages, and internal anatomy."

And the same principles apply to physical nature. It is possible from the nature-study point of view to give a series of ten or twelve interesting lessons on heat starting with such a

question as " how does heat affect our daily life?", and omitting all reference to atoms and molecules and ether wave motion and coefficients of expansion, etc.—a series of generalizations in the common physical science teaching which reminds us of the root-stem-leaf order of study in botany and the head-thorax-abdomen order of zoology.

One more illustration must suffice. In nature-study we make an educationally organized study of trees, grouping the facts learned around such topics as "Trees in their Relation to Man," or "Elementary Forestry." Here again the every-day interest prevails, and obviously such a study of trees might be no less organized in an elementary way than are the same facts in a "Manual of Trees." The "Forestry" touches the nature-study point of view, the direct human interest in trees; the "Manual," is the science point of view, interest primarily in organized knowledge as such. This illustration suggests that the nature-study point of view might lead, in more advanced work, to application of scientific principles, e. g., in forestry and agriculture. In fact much of the so-called "applied science" of our day seems to be in line with what we have agreed to call the nature-study point of view in contrast to that of pure science. But applied science differs from nature-study in that it depends upon the principles of pure science. It is simply technical, organized science modified by the nature-study point of view.

Nature-study, then, stands for *educational organization* based on the direct human interest in nature. Science stands for *scientific organization* based on direct interest (1) in organized knowledge for its own sake, and (2) with the hope that possibly such organized knowledge may some day become of direct interest in applied science.

Thus analyzing science and nature-study, it does not seem probable that anyone with experience in schools will dispute the statement that *nature-study, minus the scientific organization adapted to mature minds, is the proper work for elementary schools.*

And now we come to the latest chapter in the science of teaching. In previous paragraphs I have had in mind the science of advanced research, the science of the scientist, which has been and, on the whole, in practice still is the science of high-school and college teaching. From that nature-study for young children should beyond question be sharply differentiated. But

a new right-about-face has recently come in science teaching for high schools. Within five years there has come a reform movement, a new science teaching for higher schools. To be brief, that reform movement philosophically and educationally considered is simply the nature-study point of view, the every-day life point of view, adopted for high school teaching. It is the nature-study attitude for which the leaders of nature-study have stood for many years.

The present situation must be obvious. High-school science is tending towards adopting the nature-study point of view and rejecting the scientist's point of view. Does it mean that nature-study for elementary schools and high-school science from the nature-study point of view are to be wasteful duplications in our educational system? I believe not. We must still continue to draw the line along scientific organization. The ideal of nature-study should be held primarily for the elementary schools, that is, study of nature in these schools should not deal with the larger principles of organized science, although its educational organization may give scientific training and facts and grouping of facts which will well lead the way to the real science of the high school. I believe that the nature-study point of view, the human interest point of view, the applied science point of view will vastly improve our high-school science, but to advocate that high-school science should be changed to nature-study without the great principles of science would be taking a decidedly backward step. Experience has demonstrated beyond a shadow of a doubt that high-school pupils properly taught on a basis of nature-study are able to grapple intelligently and eagerly with the outlines of the great principles of our modern science. If you doubt, I should like to introduce to you many high-school boys and girls graduated from the schools into life's work, not into college, within recent years and let you persuade yourselves that even a high-school pupil may get a glimpse of the meaning of great science generalizations,—for example, the atomic theory, the law of conservation of energy, the theories of light, heat and electricity, the biological theories of evolution—all of which we must admit are ideas which should be of great interest to every liberally cultured citizen. In short, we must continue to have introduction to organized science, to scientific generalizations, in our high schools; and those who in theory

advocate that organized science should be left for college surely have forgotten the fact that the vast majority of intelligent citizens can not have the advantages of college education.

Summarizing the whole matter: Nature-study educationally organized is beyond question best for the elementary school. Introductory science, scientifically organized on the educational basis of nature-study, is the ideal for the secondary school. Here are two points of view, the scientific and the educational, strict science and nature-study, each with something important for all liberal education involving studies of nature. The method of study is fundamentally the same, but should be modified to suit the advancing maturity of the child's mind; the materials for study are drawn from the same source, the nature around us, but may be selected and graded without exhausting the supply; the point of view is the fundamental difference—scientific versus educational organization, real nature-study versus strict science.

It must be evident from the above discussion that the problems of the relation of elementary-school nature-study and high-school science teaching involve differentiation chiefly in organization of facts to be taught, but in all other respects the relating of nature-study to elementary science is chiefly a question of adapting essentially the same method of study to pupils of advancing stages. However, the difference in organization of facts is educationally of sufficient importance to justify the term "nature-study" for very elementary work without the great principles of modern science.

Here, then, is the field for our new society: To develop a general appreciation of the nature-study point of view, the direct human interest point of view; to organize educationally on this basis the studies of nature in the lower school ; to avoid unnecessary duplication of the proper work of the higher schools and, without departing in the least from the nature-study idea or point of view, to pave the way for introduction to science principles in higher schools; to adjust nature-study to coming high-school science based on the nature-study point of view; and to work for the training of teachers who can apply the nature-study idea—thus, in the broadest outlines we may now view the purposes and the outlook for the future activity of the American Nature-Study Society.

V

By F. L. CLEMENTS
Professor of Botany in the University of Minnesota

In turning away from the work that has done so much to bring nature-study into disrepute, we must take care not to go too far in the opposite direction. We see clearly that there have been too many trifling and unrelated facts; and no method, or a mistaken one, in presenting them. It is but natural to conclude that method must be emphasized and facts deprecated, and the point is soon reached where method becomes supreme. Professor Hodge has just shown us that, if he were called upon to choose between the possession of truth and the struggle to attain it, he would unhesitatingly choose the latter. Fortunately, a choice between the two is both unnecessary and undesirable. True science involves both the seeking for truth and the finding it. It is an endless circle in which the seeker finds truth only to recognize that the latter makes possible further and deeper search and this in turn new truths. Let us not think then that the mental disciplining of the child is the one object of nature-study. It is no more important, no more fundamental than the acquiring of those facts which put him in touch and keep him in sympathy with the natural world about him.

Questions of what nature-study is and how it should be taught have been much befogged by the view that nature-study and elementary science are totally different things. A careful examination of this point shows that this is a mistaken idea. The method of independent observation at first hand is as vital to the one as to the other. The material to be used is the same, and to give the best results in either case it must be used in some definite sequence. In both nature-study and science, there is one best method and others less good. There is the best material, that which touches the student closely and every day on all sides, and the poorest, in which the points of contact are artificial or infrequent. In neither should the material be merely an incident. The single difference between the two is merely one of degree, or better, one of time. Nature-study is science for the child, science is nature-study for the "grown-up." They are the two parts of a life-long search for truth; they make up the continuous task of "problem-solving," in which the problems must be graded according to the age of the student.

The crux of the whole question of the future value and position of nature-study lies in training teachers to teach it in nature from nature alone. Nature-study, like all studies in the schools, suffers from over-teaching. The teacher must organize the work and must guide the student intelligently through it, but he must do no more. His task is to put the student in the right attitude, to show him how to work, and then to keep his hands off. We all know that it is only the things which a student sees and does and thinks for himself that become a part of him and are really worth while. Unfortunately we often forget this. School is but a part of life, and one's own experience the only real teacher. For these reasons, we must expect no real improvement in nature teaching, no broader recognition of its fundamental value until we have trained a new generation of teachers. The teacher needed cannot be adequately trained by six weeks in a summer session, no matter what the school. Nor can he be trained by a year or two of botany or zoology as taught in the vast majority of colleges and universities. Nearly all such courses are formal and special, and have very little of nature in them. They are for the most part intensive microscopic studies of structure, particularly of the lower plants and animals, Many of them indeed actually unfit the student for the teaching of nature-study. In spite of these facts, it goes without saying that the preparation of teachers will still be carried on by the colleges and universities. This will be done successfully only when they radically change both the method and the matter of teaching elementary science. The laboratory must be replaced by the greenhouse and the field, in a large part if not wholly, and the microscope must be recognized as a valuable accessory and not the chief means of study. More important still will be the development of courses which will give to the student, not only the exact methods and materials that he will use as a teacher of nature-study and of high-school science, but also that broader training without which a competent and enthusiastic teacher is impossible.

We may discuss the problems of nature-study year after year, and we may come to agree fully as to methods, materials and results. If, however, we fail to take steps at once to point out what constitutes adequate training for the teacher, and to see that this training is actually made available in fact and not in name, we have wrought to little purpose. Vital changes in edu-

cation are pending, and the friends of nature-study must be ready to take advantage of them. The traditional rule of the three R's cannot last much longer in education. Industrial and household training on the one hand, and nature-study on the other, together with the personal training of the body and the mind in hygiene and possibly in music and art, must soon be made the foundation of our educational system. The R's will not be lost. They will merely take their rightful places as tools, not as ends in themselves. It is against this time that the believer in nature-study must hold himself prepared.

VI

By W. E. PRAEGER
Professor of Biology in Kalamazoo College

In the papers we have just listened to there is one very radical difference in the points of view. It has been stated with equal positiveness that nature-study is and is not science. It is evident that the acceptance of one or the other of these statements may have far-reaching influence on the content and the method of teaching. I hold that nature-study *is* science and is simply the name applied to such parts of natural science as can appropriately be taught in the grades. The method of presentation of these facts will differ widely from that in use in the high-school or college, but it is science teaching nevertheless.

There should be no break in the continuity of science teaching from the kindergarten to the college, no more than there should be in the teaching of literature or mathematics. The idea that nature-study is not science leads to serious results, the responsibility for accuracy seems to disappear, and much of the nonsense and weak sentimentalism that has brought discredit on the subject is due to this fundamental error.

VII

By JOHN G. COULTER
Professor of Biology in Illinois State Normal University

I am glad that the discussion has turned to the adequate preparation of teachers of nature-study, for surely herein rests any adequate fulfilment whatsoever of the ideals with respect to which there appears to be general agreement. Our own training department has made the fair criticism that our courses in biology do not supply them with eager teachers of nature-study,

and I am prepared to believe that this is largely due to the non-use of the nature-study method in those courses. We now have in operation a course entitled "Nature-Study Methods," open to students who have completed the general courses in biology, by means of which we hope to turn out a somewhat better crop of practice-teachers for the spring term.

But we find ourselves distinctly restricted in the effort to use the nature-study method in our biology courses by the limitations of time, by the rigidity and conservatism of country superintendents' examinations, which demand an acquaintance with too large a body of facts, and, somewhat, by college requirements for entrance and advanced standing. Here appears to be a point of attack.

I take it that Mr. Bigelow in differentiating between "human interest" work in nature-study and the "research method" in science will permit the translation of his "human interest" qualification into "things of common experience," [1] for I am not prepared to think that research lacks in human interest or that nature-study should be lacking in the research method. It is evident that there is really slight, if any, difference of opinion among us upon this point, and that nature-study is believed to merge as gradually into science as the boy into the man; but it would be a matter for regret if on account of any ambiguity of terminology the impression should be created that we are standing for so distinct a separateness between nature-study method and science method that a teacher might deem her science courses really worth little in successful nature-study work. I have seen teachers distinctly handicapped by just such an impression, and reluctant to use at all of the store of facts gained in the science courses for fear they would be used in the wrong way.

If it comes to a discussion of what science generalities may be properly used in the nature-study course, I should like to have the idea of "plant food" discussed for one.

VIII

By J. W. SHEPHERD
Director of Science in Chicago Normal School

(1) Nature-study is not Science, but it is scientific.

(2) In projecting a nature-study course one should distinguish carefully between nature-study and other subjects dealing with

[1] In the paper referred to the author said "human interest in everyday life."

the same material, for example, between nature-study and science and between nature study and geography.

(3) The chief difficulty with nature-study teaching today is not so much a lack of knowledge of the subject-matter as it is a lack of a workable, consistent point of view on the part of the teacher.

(4) The function of the teacher in nature-study is to select problems that have their roots in the experiences of the children and then see to it that these problems are the children's before they begin to work upon them. Nature-study should furnish an opportunity for children to work out problems with material.

IX

BY F. L. CHARLES
State Normal School, DeKalb, Ill.

It is a very suggestive fact that we humans seem to interest ourselves first in those things which are farthest away from us and only later come back home to study the near-at-hand. Astronomy was old when Physiology was young. The agriculturist hitches up and drives to town to spend his good time and money upon some *lusus naturae* when he could not be induced to expend the price of a postal card to obtain useful information on some matter of vital importance to his immediate welfare. Is it not possible that in our preliminary survey we have overlooked a most important portion of the very wide field which we are attempting to cultivate? Writers and general texts in nature-study give scant consideration—if any—to topics bearing upon the structure, activities, and immediate welfare of the human body. Some, unfortunately, speak disparagingly of subject-matter of this character in elementary schools.

I raise the question: May it not be considered orthodox to include the human body and its environmental relations in the realm of legitimate nature-study material?

Is there any natural, material thing under the sun more worthy of study than the human body? Many children are being taught grasshopper anatomy who hear no helpful word concerning their own bodies. This cannot be right. Surely, so long as man lives in a temple he should aspire to a fairly intimate acquaintance with the parts and purposes of his domicile. One who is fitted to teach the child concerning plant and animal life

is doubtless as well prepared as any to instruct the child concerning himself.

My argument is that we can best present this subject from a comparative viewpoint and as nature-study material. I know of no better approach to the study of human teeth than the study of the dog, the squirrel and the horse as illustrating different food habits and dissimilar dentition.

We are best acquainted with our worst selves. We know pleurisy but not the pleura; and tonsilitis but not the tonsils; we cannot locate the vermiform until we have experienced appendictomy. When men come to look at their own physical selves as interestedly and as inquisitively as they examine into any new phenomenon or into most ventures, then there will be less of quackery and fewer who prey mercilessly upon the ignorance and credulity of their fellow men. In other words, nature-study values apply to the study of the human body, and it should receive fuller consideration from the workers in this field.

X

BY S. B. McCREADY
Macdonald Institute, Guelph, Ontario

Nature-study is essentially an out-of-doors and out-of-school study. We argue that it brings the out-of-doors into the school, but that is only incidental. Its chief operation as that part of nature's system of education recognized and used by the school goes on in the individual boy away from his class and out from the school. The schoolmasters have been too diligent in cutting and fitting it into a piece with all the other pieces that go to make up our courses of study. It is in danger of being organized and systematized to death. It is forgotten that it is a reflection of nature's education and "Nature, that dear old nurse," doesn't give her beneficent training through systems nor does she ever turn into a pedagogue.

The quality of nature-study is not strained. It is not feverishly impatient; it is not attempting the whole programme of outlined study; it is not inciting far-fetched interests. It is going about one's business or one's play soberly and patiently; it is concerning itself with the simple things that meet us indoors and at the doorsteps; it is making the near things the important ones and the interesting ones.

From the teacher's standpoint, three views are essential for normal procedure: (1) the realization that schools, school-classes, school-books, school-studies and even school-teachers are artificial things imposed upon children by civilization's necessities; (2) that after school days there is "a life to be lived and a living to be made;" (3) that a large and important part of an individual's education comes from his contacts with innumerable out-of-school experiences.

The school has divorced itself from this influence. Nature-study is a call back to these touches with Nature and to a resulting natural education. It is no new thing. Every *good* teacher has taught nature-study. It is essentially *good* teaching. It is that good teaching—good pedagogy if you will—that selects and emphasizes right and essential things for the training of children while rejecting or minimizing the importance of non-essentials, even if time-honored in their use. The nature-lesson may be taught everywhere and anywhere in the school program; it may be contained in a word or story, a nod, a smile, a pat on the shoulder, a thank-you, a reprimand, a suggestion; indeed by any of the kind old nurse's methods of instruction. It isn't a thing apart from arithmetic; it is realized there when new views of common out-of-door operations or transactions are brought into the life's experiences; it isn't a thing apart from any subject.

From my three years' experience in the training of Macdonald scholarship teachers, I have concluded that this controversy between nature-study and elementary science is confusing and needless. The schoolmaster is too pedagogical for the teacher who is to bring her children and nature into intimacies. The prime need is to become an ardent lover of some phase of nature, willing to woo and win by pursuit and search. It doesn't make so much difference what the special interest is in. One taste of nature makes an appetite for the wider interests that may be needed for a full sympathy with a schoolroom of children from different homes. The need is to acquire a hobby after the old naturalist's manner rather than after that of the scientists; at our school of agriculture it may be chickens, cattle, sheep; fruit growing, tree growing, vegetable growing; gardening, plant-experiments, weather, soils and rocks, or what you will.

But being a first-hand nature-lover, and given a love for children, the school teacher will find her method and her field.

XI

BY I. B. MEYERS
School of Education, University of Chicago

We seem to agree that in theory and spirit it should be our aim in nature-study to deal with the nature materials and phenomena around us which are of direct interest to the children, and to deal with them from the viewpoint of their interests. If we adhere to our theory it seems that our main problem in nature-study is that of bringing children into free and direct contact with their nature environment, to note the genesis and nature of their interests, and to try to establish some method of teaching procedure which insures the utilization, multiplication, and growth of these interests. Such practice will tend to eliminate the vexed problems, so prominent in educational discussions, of what to teach and how to teach it, and will turn our attention to a study of conditions essential to the genesis and growth of genuine interest. In fact it should do much to rid the teaching fraternity of its antiquated conception of teaching for the sole purpose of communicating a fund of knowledge which it believes to be of future value to the children. We will strive to gain the child's viewpoint, to establish ourselves in his sight as an understanding and sympathetic aid in helping him to gain an enjoyable acquaintanceship and an intelligent understanding of the things about him and in aiding him to establishing relationships with his nature environment. If we believe that a certain phase of nature should be known and understood by a group of pupils we should bring the subject to their attention in the way we believe most favorable to securing that acquaintanceship and understanding. If in the experiment interest is generated and if the children exhibit a certain eagerness to extend their acquaintanceship with the subject at hand, and we can furnish means giving opportunity for extended investigations, then we have conditions for genuine school work. Some such condition as this must form the basis for selection in our courses of nature-study rather than certain topics which we believe essential for pupils to know. This does not in any sense eliminate our pre-selection of topics; it only demands that we secure the genuine interest of the children in the subject before settling down to organized study.

XII. EDITORIAL REVIEW

It seems desirable that, for the convenience of some readers who have not systematically followed the literature of nature-study in recent years, the foregoing discussions should be reviewed in this connection. Otherwise some misunderstanding is sure to follow.

The general conclusions are as stated in the editorial note at the head of the first article in the series; but a number of minor points deserve comment.

(1) Obviously there is in all essentials agreement with the line drawn between nature-study and science in paper No. IV. It is true that papers No. V and VI state that "nature-study is science for children"; but we notice that No. V says "Problems must be graded according to age of student" and No. VI speaks of "natural science which can be appropriately taught to children." In other words, both these authors (and all the others) admit that we must distinguish between elementary and advanced studies of natural things, which is obviously in harmony with those who urge a distinction between nature-study and science. The one slight difference in words, but practically of great significance, is that the authors of V and VI offer no suggestion as to how we are to determine what subject-matter is proper "science for children;" but No. IV urges that the generalities of science are not proper and that the absence of these is characteristic of good nature-study—the nature-study approved by all the men of science who in recent years have carefully studied elementary education. You may call such proper elementary work "science for children," if you prefer; but for brevity and definiteness most experts in elementary education will prefer the term "nature-study." To say that "nature-study is science for children" is logically parallel with the statement that "a puppy is a dog not grown up and, therefore, there is no difference between a dog and a puppy." But there is sufficient difference to make it useful to distinguish between dogs and puppies by using the two words. Likewise, while good nature-study should in the grammar school begin to develop into science, its characteristics are distinct enough to warrant the term "nature-study" for elementary study of nature independent of the characteristic generalizations and technicalities of science. Think of nature-study as a young, an immature, a "puppy" stage of science teaching, if you wish;

but for the sake of great convenience and definiteness let us agree that "nature-study" means that elementary stage. We need the word "nature-study" in scientific education just as we need the word "puppy" in connection with the canine genus. There is no reason why we may not attach, in truth the best usage already has attached, a very definite meaning to the word "nature-study," just as to the word "puppy." And in that distinction between nature-study and science we need to mention only one thing, namely, leave out of nature-study for elementary schools the characteristic organized generalizations and technicalities of science; but in the early high-school years let nature-study grow into science as gradually and as surely as the puppy grows into the dog. We must agree that nature-study and science are not two things; but simply two stages in the same continuous process of scientific education which for convenience we call nature-study in the elementary phase and science in the advanced phase.

(2) A practical suggestion is to be found in the report that in some schools where nature-study is called science in the elementary school, the pupils enter high school and try to avoid science because the name leads them to think it a duplication of the elementary study.

(3) Some of the speakers seemed to urge that nature-study is science because they wanted nature-study to be *scientific*. In fact, all who have emphasized the method of teaching, "problem solving," rather than subject-matter, have evidently meant that nature-study and science teaching are the same (in method). Then instead of saying that "nature-study is science," which as above pointed out forgets to consider proper grading of subject-matter, let us avoid the quibbling with words by saying that "*nature-study should be scientific*" in method and aims. In other words, nature-study is science *in method;* but we should make it different *in subject-matter* adapted to elementary pupils.

There is really no danger now that nature- study will tend away from scientific methods and aims. Only one or two articles in THE NATURE-STUDY REVIEW in three years have definitely pointed away from the approved methods of modern science teaching, and the replies from readers showed clearly that nature-study as a general movement could not go far towards becoming decidedly unscientific in method.

(4) The question of training teachers is entirely outside the line of the main discussion and should introduce no confusion regarding principles. As an independent topic it deserves discussion at the next annual meeting of the Society.

(5) Earlier discussions in this journal have pointed out, in harmony with the first paragraph in paper No. V, that facts and methods must be considered together in nature-study and in science. There is certainly a close relation between the value of the mental discipline given by application of the modern scientific method and the value of the facts in the getting of which the method is used. We are certainly tending to revamp our high-school and college teaching of science in line with this recently recognized principle.[1]

[1]See this magazine, Vol. I, No. 2, March, 1905, Page 55.

CHILDREN AS NATURALISTS

[EDITOR'S NOTE.—This series of letters from readers is continued from the January issue of this magazine.]

III

By H. N. LOOMIS

Normal-Training School, New Britain, Conn.

The article "*Are Children Naturally Naturalists*," in the November REVIEW is timely, indeed, long overdue. I know of no assertion which I have come to regard more groundless, or one that has led more astray and generated more bad spirit in the nature-study movement than the doctrine challenged by the writer of this article. Among my acquaintance with teachers, the really able men and women engaged in bringing school children into helpful contact with the outdoor world, almost none are allying themselves with the nature-study movement. In fact, it requires some courage to use the term in their presence without qualifications and apologies. When one seeks the reason for this estrangement among the workers in this particular field, he finds it in certain dogmatic and unproven assertions of nature-study writers and speakers. Prominent among these assertions is the statement that children are naturally interested in plants and animals, while the attention they give to machines, experiments and the operations of street, factory and railroad are forced and unnatural and even harmful before a certain mystical age. For some years I have watched for some statement in reliable quarters setting forth *when*, *where*, by what *means* and by *whom* this fundamental doctrine was scientifically settled. The matter is of considerable importance for it has driven apart earnest men and women striving for a common end.

Without attempting at this time to trace the history of the modern nature-study movement, or to determine who first broke and prepared the soil, I wish to suggest the probable origin of the doctrine under discussion: (a) Of late, teachers of biology have written more, and perhaps more persuasively, than those engaged in teaching the physical sciences. (b) It is during this time that teachers of the physical sciences have had to face a new and difficult philosophy; and it has not been evident to all just how the vortex theory, electrons, etc., would effect popular ex-

planations. This has had without doubt some effect on elementary teaching of these subjects. (c) Publishers have been active in turning out a vast quantity of attractively gotten up matter on plants and animals. This includes, of course, the product of "nature-fakers," big and little. (d) Public speakers have been susceptible to this run on biological subjects and have done free advertising. (e) I think it must also be admitted, that the physics introduced from above into high and grammar schools has not proven entirely satisfactory. This attempt to replace the excellent point of view of Arnott, Ganot, Huxley, Stewart and others, by a mathematical one is quite generally recognized as having failed to meet the needs of the majority of pupils. Certainly it has given ample grounds for the biologically inclined to exclaim, "I told you so!" (f) During this same period the culturists have been fighting in their last ditch, as some of us believe, for their peculiar definition of education. They have clearly seen that if they could adopt the material of their antagonists—the scientists—and yet shape it to meet their ends, they would in so doing succeed when apparently acknowledging defeat. The path to the most valuable type of nature-study has without doubt been more blocked by the lingering fears of those inclined toward the cultural definition of education than we have been in the habit of thinking. Educational conservatism when analized is largely found to consist of a dread of "the useful, the practical, the helpful, the necessary," prefering rather to dwell in the comfortable abode of the past than to engage in the problems of the modern home, shop, farm and street. Consequently, the curious and trivial has marked the nature-study movement. *Anything, anywhere*; so long as it has no immediate connection with the present and future needs of the child. The color of autumn leaves, but not the color of the soil and its cause; a trip to the meadows to see the wild flowers, but no visiting of nurseries to see the methods of producing and rearing of food plants; frequent mention of toys, but no attention to the pump and the steam-engine. Such you will bear witness has been a marked characteristic and tendency of the nature-study movement. (g) The tendency to restrict nature-study to the presentation of plants and animals has been reenforced by certain aspects of the doctrine of evolution. While one would be exceedingly brave to attempt a definition that

does justice to the various efforts at defining, it requires, however, no special skill or insight to see that in all modern attempts the idea of development, individual and social, is more or less prominent. Development in this connection means change from some form or state of activity to some other form or state of activity, presumably more complex. The particular portion of the development theory that has been used to strengthen the plea for the study of plants and animals in the lower grades, to the exclusion of all other aspects of nature, is the culture-epoch theory. This theory states, in general, that the stages by which the race has risen from savagery to modern culture are reproduced in their natural order in the life of the individual. If it can be established that primitive peoples take greater interest in plants and animals and only relatively late develop interest in the physical portions of their surroundings, then the teaching of plants and animals to children seems the only portion of the natural realm with which to begin. This is true of primitive people, however, only in a very general way. If one turns to the writings of anthropologists, he finds that the savage's dependence on the physical agencies employed in securing the benefits of plants and animals is only second to his dependency on the plants and animals themselves. The uses he makes of flint, clays, bones and metals and the needless labor spent in decorating them is indisputable evidence as to where his interest lies. But if we need further evidence to show that the interest of primitive peoples are at least as much centered on the physical as on the biological, we should recall the often very elaborate explanations of the origin and working of the forces of nature as they encountered them. Were, therefore, the culture-epoch theory of unquestionable, educational validity, we should have to declare, if not in favor of the physical realm, then for its equal educational value with the biological. But the culture-epoch theory itself is extremely difficult and uncertain of interpretation; at best it "does not hold in details, but only in a rough and general way." Therefore, in fairness to the theory, we cannot call it in to decide between the claims of closely related topics.

We have now before us some seven or eight influences that have conspired to elevate the study of plants and animals above their natural settings. And it must be evident that not one of them, or all of them combined, furnishes sufficient foundation

for the dictum. We must turn therefore, to the testimony of those who have had experience in teaching children lessons taken from different parts of the outside world, and we have studied the reactions of the children to both of the great divisions of nature—the biological and the physical. Agreeable to the request of the editor of THE REVIEW for experience bearing on the question, "are children naturally interested in living things, and very little in the lifeless," I will answer the question first and give my experience afterwards. My experience with children and observation of the work of other teachers lead me to reply to the question with an emphatic no, not in the least, is it true!

I think I can lay claim to a fairly broad and comprehensive experience with this question. I have taught elementary science in two of the larger New England normal schools for about fourteen years. My teaching experience during this time has been about evenly divided between the biological sciences of botany and zoology and the physical sciences of chemistry, physics, mineralogy, and physiography. I am practically always teaching a biological and a physical science during the same term. So far as I can analyze my mental attitude, I have no particular bias toward any of the sciences, unless it be that of physiography, and curiously enough, this is the one science which has least entered into the selection of topics for the various grades under my observation. Connected with each of these normal schools are model and practice schools in which are enrolled more than a thousand children from kindergarten to grammar school. During these fourteen years I have been in close touch with the nature work of the various grades, visiting rooms during lessons, preparing material for lessons, drawing up lesson plans, serving as "consulting" teacher and supervisor. In fact I have had that opportunity of studying first-hand the responses of children of all grades below the high school, enjoyed by science teachers in all well organized normal schools.

It must be clear why this bit of personal history is introduced at this point. The attempt has been made to show that the statement, "children are naturally interested in living things and very little interested in the lifeless," is a statement that does not rest on secure foundation. If, therefore, it is to remain, it must find support in the testimony of competent witnesses.

Of the hundreds of lessons which have come under my ob-

servation, those taken from chemistry, physics and mineralogy have been almost always satisfactory. By satisfactory, I mean the teachers have secured the results they were after, and the children have been unusually attentive and have manifested unmistakable pleasure at the prospects of another lesson. I wish I could report equal satisfaction and interests for the lessons taken from botany and zoology. I have known instances in the first grade where observation and discussion of some simple physical change has been seized with avidity by the children, while an attempt to stimulate an interest in a plant has fallen flat. I will cite an instance that has come under my observation during the last two years. A young teacher taught minerals to a class one year out of the kindergarten. So interested were the children that they carried quartz, feldspar, mica, calcite, barite etc., as pocket pieces, searched for them in the fields, and by the road, traded them with one another and disputed their physical properties on the playground. The same teacher was asked to turn to some lessons on local animals with a later class. The interest displayed by the class in grasshoppers, snails, fish, toad, etc., was not particularly marked, and noticeably inferior to that displayed in minerals by the preceding class under the same teacher. I understand, of course, that this single instance proves nothing! But taken with a score of other instances having very similar results, it does demonstrate a certain tendency quite as convincingly as it would had it been performed under standard scientific conditions. Of the hundreds of teachers whose teaching of lessons from nature I recall, but two or three have frankly said they did not enjoy giving simple observational lessons on physical phenomena. On the other hand, many have frankly expressed a dislike for lessons on plants and animals, and few, any pleasure in giving lessons on these objects.

This testimony from teachers is misleading if taken without reference to their educational environment. For more than twenty years in the normal schools referred to, influence of a very persuasive kind has been applied in favor of lessons chosen from the physical realm. During the same period much less thought has been expended on selecting and preparing lessons from biological topics. As a consequence, a teacher connecting himself with either of these institutions enters an atmos-

phere, the "set" of which is strongly toward lessons taken from the physical realm. He sees lessons of a high grade on simple chemical and physical properties and changes; he is led to recognize the peculiar disciplinary training of such lessons; to review the dependence of modern society on the applications of physics and chemistry. While therefore, the above testimony affords sufficient ground on which to maintain that children of all school ages are interested in the physical portions of their surroundings, it would not be fair to infer from it that children are more interested in the non-living than in the living portion of their surroundings.

It must be recalled that the purpose of this paper is to submit evidence bearing on the question, (1) "are children naturally interested in living things and very little interested in lifeless things," (2) to offer an explanation for the possible origin of this statement in current literature. I am not expressing an opinion as to whether we ought to interest children of the lowest grades in the physical side of their surroundings, or to pass any judgment on the relative value of the physical and biological subjects to children. In reply to the first question, I must say in the light of my experience that children of all school ages display a keen and well-sustained interest in the lifeless portion of their surroundings when presented objectively by competent teachers. Furthermore, I hold as a theory that the general run of children are not interested in anything in particular, and everything in general, and that a skillful teacher, equally equipped in biological and physical topics and without prejudice in favor of either, will secure about equal responses from the two realms. As for the origin of the idea that children are naturally interested in the living part of their surroundings and without interest for the non-living, it may have been in the statement of some over-zealous biologist, more probably, however, it was used as an argument in support of some contention. Once started, it came into very general use. It must be acknowledged that there has been a good deal to strengthen it and give it apparent validity as an educational doctrine.

PRACTICAL NATURE-STUDY WITH BIRDS

BY GILBERT H. TRAFTON
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One of the most effective phases of work in nature-study is that which calls into play the manual activities of the child in providing for himself opportunities for making studies on the life around him. Bird study lends itself especially well to this line of work in the matter of furnishing nesting houses for the birds. The very fact that the child is doing something for the birds is a means of developing in the child that helpful sympathy with nature which is the chief end of nature-study. And furthermore an excellent opportunity is offered for developing the perceptive powers of the child by watching the birds that may come to his house.

These observations will be carried on with much greater ardor and thoroughness because the child has himself helped furnish the conditions which make his observations possible.

The writer has sought to encourage this kind of work both in building bird houses and feeding birds in the winter. But there has been one almost universal result which has discouraged both teachers and children, namely, that whatever was done was rendered of no avail through the intervention of the quarrelsome English sparrow. If other birds came, the sparrows came too in greater numbers and drove them away. In many parts of the city this discouraging result was so universally the outcome that this line of work had to be abandoned.

In that section of the city where a few native birds remained, an effort was made to see if any plan might be devised by which this difficulty could be overcome without resorting to a wholesale slaughter of the sparrows. The author had seen reports from several observers to the effect that the sparrows would not occupy a moving bird house suspended by a wire; and some experiences of the author in feeding winter birds had pointed to the same conclusion. In order to try this plan on a large scale the author visited the schools situated in the more favorable localities, explained the matter to the children and asked their cooperation. Some bird-cage springs were furnished the children, but as the supply was soon exhausted, the children were told

simply to suspend their houses by wires. As a little incentive, a prize was offered for the best account of experiences with the bird houses. The children responded in large numbers with great enthusiasm, which showed how easily this locality might be made a paradise for the birds were it not for the discouraging intervention of that annoying pest, the English sparrow.

In the fall statistics were gathered from the children relative to their experiences with the bird houses, and the results are given below.

In 33 moving or suspended houses 26 pairs of birds began to build nests (12 bluebird, 12 wren, 3 robin, 1 starling, 6 English sparrow); young were reared in 8 (2 bluebird, 4 wren, 2 sparrow); birds were driven away from 6 houses by sparrows (3 bluebird, 2 wren, 1 robin). In three other moving houses the sparrows attempted to drive out the inmates, but were unsuccessful. The sparrows attempted to drive out the starlings, but were unable to do so, one of the sparrows being killed in the fight. It is interesting to note that robins are beginning to nest in these houses.

In 27 stationary houses 24 pairs of birds began to build nests (13 bluebird, 7 wren, 2 robin, 3 sparrow); 15 reared young (8 bluebird, 5 wren, 1 robin, 1 sparrow); the birds were driven from 3 houses (2 wren and 1 robin) by the English sparrows.

These results show that the English sparrows were not outwitted by the device of a moving house. The sparrows began to build in six of these houses and two pairs successfully reared their young, and doubtless others would have done so, had they not been driven away by the children. In nine cases the sparrows attempted to drive out birds which had begun to build in these moving houses and in six cases were successful.

These discouraging experiences have disheartened the children in their efforts to do something for the birds, both in providing nesting houses for them and in feeding them in winter. The author would be very grateful to hear from anyone who has succeeded in outwitting the sparrows, or has any suggestions as to how it may be done.

NATURE-STUDY AND HIGH-SCHOOL SCIENCE

BY HERBERT BROWNELL

State Normal School, Peru, Nebraska

To the teacher in the normal school come those who have various degrees of preparation in the high-school sciences, and the problem of fitting them, some for teaching science in high schools and others in the grades, makes the teacher appreciate keenly the unsatisfactory condition of the science work of the elementary and secondary schools, especially as regards the preparation of those who are to teach it, and its differentiation in the stages of advancement through the schools.

By way of illustration of distinction between the nature-study of the grades and high-school science teaching, both as regards matter and method, the Lessons on the Moon, used in my own class in Elementary Science, are here given. The study of the moon in the class in astronomy, based though it is on observations made by the pupils themselves under direction of the teacher, needs no particular discussion, even for purposes of contrast.

In nature work there is chosen from the immediate life-surroundings what is readily comprehended by the children, what will best serve to train them in being close, intelligent observers of such surroundings and of what goes on in the world about them, and what at the same time provokes thought, arousing the spirit of inquiry as to the significance of what is observed. The facts are not grouped with reference to any branch of science; the matter selected and its manner of presentation is made to conform very largely to the mental needs and abilities of those taught. In the high school the student is to adapt himself as best he may to a mastery of the facts of the science, grouped and classified according to some system and in accordance with the laws and principles of such science. And whether the change in primary purposes of science work in grades and in high school—an adaptation of matter and method to what best promotes the rapid development of an intelligent being, or, on the other hand, the mastery of a certain mass of classified knowledge—be made gradually or abruptly, a radical difference in such science teaching exists and should be kept well in mind.

It is a difference not so much in subject-matter as in the spirit of the instruction, in the immediate purpose to be served, and in the manner of procedure. Such is the thought in the lessons similar to those on the moon given here. And for those in high schools who may never have had nature-study in the grades, nature lessons might well be used as introductory work.

Not least among the ends sought in the nature lessons is a growth in confidence in every pupil of his ability to master the facts of his life surroundings and also the significance of these. While it is the teacher's province to adapt means to ends, and to at all times give direction to the work as it progresses, in no wise is the teacher to come in between the child and what he is to observe, nor rob him of opportunity to think and to tell his thoughts. Assistance must needs be given when and where needed, *but only as needed*. The problems that now vex the teacher of science in the high school must needs largely disappear when those entering the high school as students shall have had nature work under properly trained teachers in the grades. But when shall such teaching be required, and whence the teachers!

Lessons on the Moon

A. Who of you saw the moon last night? At what time? Go to the blackboard and make a drawing to show its shape as you saw it.

(Direction: All are to look "to-night" (or first clear night) for the moon, and as early as it can be seen. To-morrow be ready to help fill out the first line of this "Record" (at blackboard.)

Date	Hour	Shape	Part of Heavens	Hours since it rose (or till it sets)	Time of rising (or setting)
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....

[Let data be gathered as above at intervals of two or three days for a full month. If the weather has been unfavorable, continue the observations for two months or three. Have children get data of moon's appearance in early morning, too, if possible.]

B. 1. When the moon was seen in the west in the early evening:

(a) In what direction was it from the sun?

(b) In what direction did its "horns" (cusps) point?

(c) What kind of line was its west side? Its east?

(d) What of its distance from the west horizon (and the sun) evening after evening?

(e) What of its times of setting night by night?

(f) In what direction from us was it at sunset when it had become a "half moon?" How many degrees (or what part of a circle) was it then from the sun?

2. (a) When the moon had become "full," at what time did it rise? (b) What part of a whole circle was it then from the sun? (c) How long a time since it was first seen as a "new moon?" How long since it was a half moon? (d) What was true of the times of rising of the full moon night after night? (e) How long from one full moon to the next? (f) When the moon was a "half moon," what fraction of this time had elapsed since the moon was "new?" (g) Which "quarter" is complete when the moon is full?

3. If the moon shall have been observed mornings before daylight:

(a) What of its change of form (phase) from morning to morning?

(b) In which direction from the sun is the moon now?

(c) What of its distance from the sun morning to morning? What must become true in several days time?

(d) When a half moon is seen in the morning, through which "quarter" has it passed? To what phase does it come at the end of the 4th quarter? Why do we not see the moon then for a time?

4. With the moon full and rising at sunset, what is the position of earth with reference to the sun and moon? At the time of "dark moon" what is direction of sun and moon from us? Which side of moon as lighted by the sun is toward us? What causes the return of the moon? What kind of body must the moon be as to giving off light of its own (luminous or non-luminous?)

5. When the moon was new, what of its place of setting as compared with that of the sun? What when full?

6. How many full moons in a year? Why the "months" of our calendars?

[Make use in connection with these lessons of such selections as: "Wynken, Blynken and Nod" (Eugene Field); "The New Moon" (Mrs. Follen); "The Silver Boat"; "The Wind and the Moon." (Geo. MacDonald.)]

[EDITOR'S NOTE. In the above outline for lessons on the moon Professor Brownell has given us some very useful suggestions for a very practical kind of nature-study. Of course some people will object because this includes "everything from the sun and moon to grasshoppers" in nature-study; and others will say that this is not nature-study but geography." Call it either nature-study or geography, if you want to, provided you teach it by the observational method suggested; but be sure to call it geography or *something other than nature-study* if you teach it as book work. Certainly there are possibilities for good observational work. And as to bringing "even the moon" into

nature-study, we may be allowed to ask whether the moon is not at least a little nearer the every-day life of the *average* man, even the farmer, than are pussy-willows, grasshoppers, butterflies, pet rabbits, and similar things approved by those who object to sun, moon and stars having a place in nature-study. Certainly there is something to be said in favor of the fact that material for observational study of the sun and moon may be found in most parts (we must except congested quarters of big cities) of the world. Will other readers who have experimented with such studies report to THE REVIEW. Some readers may not know that Dearness' "Nature-Study Course" contains good notes for such lessons.]

NOTES ON NEW BOOKS

Decline of Darwinism. So many times in the last few years have the more or less sensational periodicals published articles on the "Decline of Darwinism," the "Deathbed of Darwinism," or the "Fall of Darwinism," etc., that many readers unfamiliar with the advances of biology have inferred that something is decidedly wrong with the theories associated with the name of the greatest naturalist of the nineteenth century. Moreover there is such widespread confusion of Darwinism and organic evolution that even scientific criticisms of some points in Darwin's work have been popularly taken to mean that within the ranks of the biologists there are grave doubts regarding the very foundation of the evolution theories. With such impressions existing outside of scientific circles, it is fortunate that Professor V. L. Kellogg, of Stanford University, has prepared for the educated layman a very readable discussion of the present-day scientific criticisms of the Darwinian selection theories to which so much reference has been made in scientific and unscientific journals. The new book in hand is entitled, "Darwinism Today," and is published by Holt and Co., New York, price $2.00.

Chapter I. deals with the "Death-bed of Darwinism," taking the title from a sensational publication of a few years ago. The reader unfamiliar with biological terms does not have to read far in order to discover that Darwinism is not synonomous with evolution or theory of descent, but rather is simply the name for Darwin's theory that natural selection (resulting in the survival of the fittest and best adapted) is the prime factor, agent, and mechanism of evolution. Great changes in biological theories have been made by the recent great activity in biological research and Darwin's theories along with others have been subjected to the scientific searchlights. The result has been the proposal of various auxiliary and alternative theories of species forming and even in some scientific writings there is evidence of some weakening in belief in Darwinism. "The fair truth is that the Darwinian selection theories, considered with regard to their claimed capacity to be an independently

sufficient mechanical explanation of descent, stand today seriously discredited in the biological world. On the other hand, it is also fair truth to say that no replacing hypothesis or theory of species-forming has been offered by the opponents of selection which has met with any general or even considerable acceptance by naturalists."

But in all this change of minor theories it must not be forgotten that Darwinism may fall completely without seriously affecting the theory of evolution. "While many naturalists doubt whether Darwinian selection theories satisfactorily explain descent, organic evolution, that is, the descent of species, is looked on by biologists to be as proved a part of their science as gravitation is in the science of physics or chemical affinity in that of chemistry. Doubts of Darwinism are not, then, doubts of organic evolution."

After careful critical discussion of the various facts for and against natural selection, Professor Kellogg concludes: "Darwinism as the natural selection of the fit, the final arbiter in descent control, stands unscathed, clear and high above the obscuring cloud of battle. But Darwinism, as the all-sufficient or even the most important causo-mechanical factor in species-forming and hence as the sufficient explanation of descent, is discredited and cast down." It is interesting to note that Darwin's friends and followers, not Darwin himself, claimed allmacht (all-sufficiency) for his theory of natural selection.

Birds Every Child Should Know. By Neltje Blanchan. New York: Doubleday, Page and Co., 1907. $1.00. This well-illustrated book has sixty-three pages of good photographs from life, and the descriptions of each bird is full of sympathetic interest. There are no minute descriptions as to size and color; but the author has selected those characteristics which will help to identify the birds in the fields, as well as give a glimpse of their "personality." The book can not fail to be very valuable to children or grown-ups who are trying to become acquainted with our most common birds. A. N. B.

NATURE-STUDY AND SCIENCE NOTES

[EDITOR'S NOTE. This department will be conducted by Chester A. Mathewson, of the High School of Commerce, New York City. Notes and suggestions may be sent to him in care of the editor of THE REVIEW.]

Forestry. The preservative treatment of railroad ties and piling has been practiced commercially for a number of years. About fifty treating plants are now being operated in this country, and the number increases each year. The treatment of telephone and telegraph poles has made no such progress, yet there is a strong desire on the part of progressive users to find a satisfactory method for prolonging the life of poles. From time to time experiments have been conducted by various telephone, telegraph, and railroad companies, but either the treatment was faulty or insufficient records of the treated poles were kept, and, as a result, neither reliable data nor satisfactory conclusions have been obtained. The Forest Service is actively engaged in experiments with treated ploes.

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AGRICULTURE IN HIGH SCHOOLS

By A. B. GRAHAM
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So long as the virgin soil, under traditional methods of tillage and cultivation, responded generously to the hand of the farmer, he felt little the necessity for that kind of education which would make him the master over the materials with which he was obliged to work. The productive power of the soil, the crude materials which he was obliged to use, and the lack of necessity for greater production to feed the city obliged him neither to conserve the productivity of the soil nor to improve the implement—nor even to give a little care to the improvement of the product. As far back as 1824, Daniel Adams wrote an "Agricultural Reader Designed for the Use of Schools," and up to 1861 there were no fewer than nine elementary books on the subject of agriculture; yet no attention was given to them except by a few scientists and a few publishers who were exerting every effort to give variety to the state school libraries that were being put on the market in the decade from 1850 to 1860. A few of these books can be found today as remnants of old state school libraries. The expensive and reckless farming carried on during the past forty years has reduced the productive power of the soil. The population of the cities has increased rapidly; and with their growth has come so importune a demand for the products of the farm that it has become quite as necessary to produce in large quantities as to produce of high quality. The people of the cities have been and are now looking upon the farmer as an individual who must be able to respond not only with his physical, but with his mental ability to furnish products from his fields that will satisfy the demands of the most fastidious.

Under the Morrell Act, the land-grant colleges were established to meet a necessity for scientific training in agricultural work, but since these colleges are at such great distances from the people needing agricultural education, and since the expense of attending such schools is beyond the means of many parents, the attendance at these colleges is much lower than the most sanguine have hoped for. These colleges, however, are performing a most important work in preparing young men for instructional, delicate, experimental work and for leadership in the practice of modern farm methods. Since at least one-half of those attending the public schools are in the elementary grades of the rural schools the necessity for agricultural education has thrust itself more or less into the elementary grades. Here the natural environment of the child is being utilized, in a small degree, to prepare a foundation for the more extensive education of the high school, which will the better fit young men and women to carry on their life work more economically and with a degree of joy and pleasure that should be the reward of every citizen.

The function of an agricultural course in the high school should be to offer studies whose general cultural value is quite as great as is their agricultural value. A young woman or a young man who sees in his agricultural work little else than the scientific side will enter life with the all-too-prevalent belief that only the practical is the open sesame to the greatest pleasures of life.

Perhaps the county, township, or village high school offers its courses at the period in the life of the child when its studies have a most beneficial effect, since in this period the individual is seeking the cause for the effect and is looking for results from certain causes. Life habits are being formed not only for citizenship, but for occupation. Neither an agricultural nor a manual training course should be offered as substitutes for present courses, but rather as a more direct adaptation and application of the present studies to the industries of the people who support the school. A protest has often been sounded against secondary education in the expression, "My child will never become a teacher or a lawyer." The demand for industrial education, and the protest against the so-called cultural and disciplinary studies, will never be properly satisfied by substituting a majority of agricultural studies or manual exercises for studies that reinforce or furnish a foundation for the moral and social virtues incident to agricul-

tural or applied science work in such courses. The question is one of adjustment and adaptability rather than one of substitution.

The course in the natural sciences should be so arranged and so taught that the child's own environment and the occupations of the people in his own vicinity should, as much as possible, become subjects for illustration and example. Any science taught as an applied science should bear upon the industries of the people who support the school. No high-school course should be so intensely agricultural either in studies or exercises that it leads to the formation of a caste. It should be reasonably liberal, rather than technical.

The high-school agricultural course occupies a middle position between the incidental agricultural exercises of the elementary school and the purely technical courses in the agricultural college. Since agricultural work is, in the main, scientific, a foundation for such a course must be made in the science branches. Soil formation, surface drainage, temperature and its effects upon plant and animal life, the distribution of animal life, etc., are agricultural subjects coming within the scope of physical geography. Capillarity and porosity of soils, film and gravity water, evaporation and mulches are subjects relating to tillage and the methods of cultivation, and come within the field of elementary physics. The setting of the plow to take more or less land, the adjustment of collar, hames, and traces to secure the most advantageous draft, the mechanics of the horse, the manipulation of farm implements, the use of gasoline and steam engines, the creaming and separating of cream, the churning of butter, osmosis in the stems of plants and evaporation from their leaves, ventilation and color harmony, are all subjects to which some principle of physics may be applied. The study of germination, vitality of seeds, plant food, the effect of environment, heredity, and selection, fertilization, budding, grafting, and the making of outdoor observations in the study of plant ecology only intensify the study of botany. There are a few biological subjects, especially heredity, selection, and the principles involved in breeding, which are much more impressive, and the results of which are more immediately seen if taught by using plants. The principles of plant breeding being practically the same as those of animal breeding, little or no attention at this period of school life need be given to animals beyond the external points of excellence.

The new zoology will treat more or less fully of the economic value of animals and insects as well as of their ecology and type-forms. Chemistry as usually taught in small high schools without proper apparatus is of so little value that if a substitution were to be made in the high-school course, zoology should take the place of chemistry. Elementary chemistry alone has so much less to do with the ordinary practice of agriculture than is usually credited to it that, if the elementary work can not be followed by qualitative and quantitative analysis, the time spent on it is worth less than that spent upon any other science study in the high school. The subject of plant nutrition does not, for the mass of farmers, necessitate a knowledge of chemistry, but rather of such studies as physics and the biological sciences. The availability of plant food requires a greater knowledge of methods of tillage and cultivation and of botany, than of chemistry.

Such subjects as may seem to require a knowledge of chemistry to be applied on the farm or in the kitchen really require little more than the ability to recognize and consider such chemical characteristics of matter as may appeal to the senses, or the phenomena of certain chemical actions. Determining the presence of albumen in milk, carbon in sugar, starch in food; generating carbonic acid gas, and knowing its characteristics; understanding the effect of salt upon juices in meats; knowing how to remove grease, fruit, and grass stains and paint or ink from woods and fabrics, are all matters requiring no knowledge of chemical reactions to make them practical. However, it is far better that the teacher who offers such exercises understand enough chemistry to assist pupils in comprehending simple chemical formula, more or less of the nomenclature of this science, and an occasional reason that comes within the understanding of the class. The subject of elementary chemistry may be taught as a part of an agricultural course, but it is far from being as important as physical geography, botany, zoology or physics.

Exercises directly related to the mathematical and natural sciences or incidental to the study of them should make up a manual training course. The making of berry boxes, models of gates, and trays for testing seed-corn; graft and bud-setting; grinding tools; rope splicing and knot tying; and planning fields and gardens, are exercises more or less closely related to the regular studies. These and similar exercises offer quite as much

opportunity for self-expression and cultivating the desire to take the initiative as is offered in any manual training school. The joy that comes from achievements, and the acquisition of habits of accuracy and manual skill result quite as much from manual exercises that apply directly to the comfort, convenience, and economy of the farmer and his family as from those exercises best suited to the trades of the city.

The function of an agricultural course is further performed by assisting young men and women to conduct tests and experiments at home, when the conditions under which the work is being done are those which they need immediately to know most about. In conducting such experiments, soil conditions, artificial drainage, topography, the demand of the markets and the keeping of the necessary records, lead the young student to consider adaptability from the point of physical conditions and the demands of the market; the keeping of records obliges the experimenter to be economical and accurate. If, after an agricultural course has been offered, there is no effort made to establish the practice of economy, all that has been offered is of little practical value. The horse or sheep that "eats its head off," or the cow, hog, or fowl that can't "earn its board and keep," are little more than living objects, satisfying a fancy; the planting of seeds whose vitality is low or those that are infected with smut or scab, results in losses far beyond the belief of the average farmer. In such farming there is not only not the least show of self-expression initiative, or profitable achievement, but there is utter disregard for accuracy, and an actual lack of good judgment and economy.

Not the least important function of high-school work is the creation of a wholesome school atmosphere that will arouse an interest in the beauties and pleasures of rural life, and the teacher of a rural school who neglects an opportunity to spiritualize rural life loses much of the joy that comes from doing good.

The value of an agricultural course or any other course must be measured in terms of citizenship, pleasure, and utility. Any course of industrial education will cultivate the spiritual, moral and social virtues. This statement is especially true of agricultural education, since it has so much to do with so many of the Creator's laws that are manifested in living things. To know these laws dispels the darkness of ignorance and superstition. Agricultural literature and natural phenomena are interpreted in

the new light of scientific truth. Drudgery is elevated to the high plane of work, where cause is sought for the result, or where results may reasonably be expected from known causes; where the production is not of itself a standard of value, but where the efficiency, skillfulness, and joy of the husbandman are the true measures of the value of industrial education. Such courses are conducive to producing enterprising citizens—they see more in the pleasures of life; the lawns, the country road, the little church and the rural school, all show the touch of an aroused interest. Contributions to public organizations are more liberal—especially to the school where there are teachers who know the needs of the farmer and who seek to offer as much for utility as for the enrichment of life.

As to the utilitarian value to be placed on agricultural courses in high schools, many specific results might be mentioned; but, in a limited territory, the writer has especially observed a new interest in the question as to how the productive power of the soil may be maintained, and how an increase in the yield of cereals and fruits can be secured. Work benches, milk testers, and germination outfits are not infrequently found in the same room with the air pump, electrical apparatus, and the microscope.

The attendance at the township and village high school has increased; a new field for education has dignified farm work, and many a country boy and girl now in the elementary grades is looking forward to the work in the high school to prepare for their life work on the farm. A country high-school course that is not too intensely agricultural offers quite as much, if not more, material than does any other school to prepare for any calling in life.

The function of industrial courses must be to answer to the call of the millions who labor with both hand and mind in preparing the individual to be an active citizen-artisan; and the measure of their value must, in a degree, be determined by the character of the man and by the product of his hand.

AGRICULTURAL EDUCATION AT THE WASHINGTON MEETING OF THE DEPARTMENT OF SUPERINTENDENCE OF THE NATIONAL EDUCATION ASSOCIATION

By DICK J. CROSBY
U. S. Department of Agriculture

A pretty good indication of the growing demand for education in terms of the environment of the children may be found in the emphasis given to agricultural education for children in rural communities in the program of the Department of Superintendence of the National Education Association at its convention in Washington, D.C., February 25, 26 and 27. The Assistant Secretary of Agriculture and the United States Commissioner of Education in their greetings at the opening session referred to the growing interest in and importance of agricultural education. The principal address at the first evening session was by Hon. Willet M. Hays, Assistant Secretary of Agriculture, on Agricultural Industries and Home Economics in Public Schools, in which the feasibility of providing a unified scheme of instruction in these subjects extending from the primary grades through the high school to the agricultural college was clearly shown. Professor Hays also explained the purpose and probable effect of pending legislation for the encouragement by the Federal Government of mechanic arts and home economics in city schools and agriculture and home economics in agricultural high schools.

On the third day of the convention the forenoon session was devoted to a Round Table on agricultural education. Dr. A. C. True, Director of the Office of Experiment Stations, outlined broadly the educational work of the U. S. Department of Agriculture. Dr. E. E. Brown, U. S. Commissioner of Education, in giving some notes on the training of teachers of agriculture, reiterated his firm conviction that this subject must eventually be taught in practically all schools for country children, and discussed pending legislation for the encouragement by the Federal Government of instruction in agriculture, mechanic arts and home economics in State normal schools. He pointed out that Federal aid to col-

leges of agriculture and mechanic arts in the United States had, in his opinion, led to greatly increased local appropriations for colleges of agriculture and mechanic arts; at least, there had been no diminution of local taxation—a result which had been feared by opponents of Government aid to education.

Honorable E. D. Cameron, State Superintendent of Public Instruction in Oklahoma, outlined the "plans of the youngest State," which contemplate instruction in agriculture in all public schools of whatever grade.

The training of teachers of agriculture by State normal schools was discussed by John R. Kirk, president of the State Normal School at Kirksville, Mo., where agriculture has been taught for a number of years. President Kenyon L. Butterfield of the Massachusetts Agricultural College, outlined plans of co-operation between the State agricultural college and one of the State normal schools in Massachusetts for the training of teachers of agriculture. This subject was further discussed by President W. M. Stewart of the State Normal School at Salt Lake City, Utah.

Dick J. Crosby, of the U. S. Office of Experiment Stations, read a paper upon Co-operation between the U. S. Department of Agriculture and State School Authorities to Promote Agricultural Education, in which the present status of co-operation was described and lines of future endeavor were pointed out. The discussion of this subject was led by E. C. Bishop, Deputy State Superintendent of Public Instruction in Nebraska.

The papers presented at this Round Table and the earnest discussions following each paper indicated that educators realize that the movement for agricultural education, not only in colleges but in secondary and elementary schools, is going forward so rapidly that it presents many serious problems to the school authorities in the several States. One of the most troublesome of these problems is to train a sufficient number of teachers for the work and train them in such a way as to give proper point of view and proper balance to the teaching of this new subject. Agriculture is about as clearly defined in the minds of the great majority of teachers as was nature-study a few years ago, and there is serious danger that unless the agricultural colleges and the normal schools exert themselves to the utmost in training teachers the subject will be taught in many places merely as a text-book subject, which will be about as serious a mistake as to teach nature-study entirely from the text-book.

At the close of the Round Table discussion a department of the National Education Association to be known as the Department of Rural and Agricultural Education, was organized by the election of the following officers: President, E. C. Bishop, Lincoln, Nebr.; vice-president, D. B. Johnson, Rock Hill, S. C.; secretary, E. E. Balcomb, Weatherford, Okla.

A number of other societies met with the Department of Superintendence. Among these was the National Committee on Agricultural Education, which held meetings on the evening of February 24 and the afternoon of February 26. The main business considered by this Committee was the training of teachers for industrial work and a discussion of ways and means for promoting legislation giving Federal aid to State normal schools. For several years there has been under consideration in Congress a bill known as the Burkett-Pollard Bill, which provides for an initial appropriation of $500,000, to be increased by $100,000 a year until it amounts to $1,000,000, to be divided among the several States and Territories for the encouragement and support of instruction in agriculture, manual training and home economics in state normal schools. Another bill known as the Davis Bill, which was introduced at the Second Session of the Fifty-Ninth Congress, provides for an appropriation by the Federal Government of 10 cents per capita to be used in the several states and territories for the encouragement and support of mechanic arts and home economics in city high schools and of agriculture and home economics in agricultural high schools for rural communities. This bill would provide an appropriation of about $8,000,000 for the support of industrial education. While no attack upon either measure was made by the friends of the other measure, there was a feeling on the part of those attending the convention that with two such measures under consideration in Congress at the same time the passage of one or the other must be deferred indefinitely. This led to an attitude approaching coolness between the respective advocates of these measures, which was happily dispelled before the convention adjourned. The National Committee on Agricultural Education invited Congressman Davis to meet with its subcommittee on ways and means, which he did, and the meeting resulted in an earnest but friendly discussion on the whole situation. This led to a proposition on the part of Mr. Davis to amend his bill, deferring the giving of aid to high schools

for agriculture, mechanic arts, and home economics until 1911, and providing that an annual appropriation of one per cent capital aggregating $800,000, be made available July 1, 1908, for the encouragement and support of instruction in agriculture, home economics, and mechanic arts in State and Territorial normal schools. This would give the normal schools $300,000 more than was provided in the Burkett-Pollard Bill, and would increase their appropriation in proportion to the increase of population in the United States. The normal schools would also have the use of this money for three years before the high school bill goes into effect, and would thus be enabled to aid in preparing a large number of teachers for this new work. Mr. Davis' proposition met with the hearty approval of the Committee and he accordingly introduced his amended bill into Congress on the following day.

SCHOOL-GARDEN HELPS

By CLARENCE M. WEED

State Normal School, Lowell, Mass.

In many schools there are sand-tables which are not in use all the time. If one can be obtained during the spring months it makes an admirable seed bed for starting seedlings of flowers and vegetables. Put in three or four inches of loamy garden soil, sifted, and sow seeds of tomatoes, peppers, marigolds, Drummond phlox or whatever plants you wish to grow, in rows. Keep well watered and next the sunniest window.

The table I have used for some time in this way is mounted on casters. In the morning I keep it next an east window and in the afternoon push it over to a south window.

When the seedlings are large enough to transplant, the best receptacles I have been able to find are the Neponset paper pots which can be bought of any seedsman. The smaller sizes, costing but twenty-five or thirty cents a hundred, do very well for many sorts of seedlings. These pots are cheap and not breakable, and have the great advantage for school-garden uses that the evaporation takes place only from the top of the soil and not all over the sides—a fact that renders ordinary flower pots of small sizes impracticable in most schoolrooms.

There are also zinc sand-pans in many schools. These serve very well to hold the pots of seedlings if they can be placed near a sunny window. Or a shallow, water-tight zinc box, made to fit the window-sill will hold them all right. Such receptacles catch the surplus water that runs through the pots and enables the teacher or pupils to leave enough water in the bottom on Friday to last till Monday.

With these simple things many schools that have no outdoor garden can get pupils to grow seedlings to plant in home gardens. And in autumn the same apparatus can be used to grow bulbs for the pupils to carry home when flowering begins.

A RURAL SCHOOL-GARDEN

By RUTH B. FISHER

The school-garden for students in the Normal School at Johnson, Vt., is situated on a hillside, as this is the best land near the main building. The garden consists of about thirty beds, 4 by 8 ft., for individual work; a rectangular strip in the rear for tall crops; and a rhomboidal side plot for vines and general experiments. Each bed contains vegetables and flowers, selected for crops to be gathered in spring and fall as the gardeners are away during July and August, best arrangement and color scheme. Johnson is not only northerly but also mountainous and hence the summer season is short. Heavy frosts occur as late as June. Still, radishes, lettuce and onion sets are started by the second week in May and gathered by the middle of the following month. A succession of crops is planned by putting plants which will give results in the fall harvest into the places occupied by the spring produce. A typical bed may consist of two rows of radishes, one of lettuce, one of onions; and these be followed by a tomato plant, two hills of potatoes, one row of beets, and a block of asters surrounded by alyssum. The beds are nearly all different. Records of the varieties, time of growth, cost of seeds and plants, and value of produce are kept. Some records show the cost to be about twelve cents and the value of products at least a dollar.

In the rectangular strip and side plot are placed such plants as pole beans, corn, squashes, sweet peas, cosmos; so arranged as to aid in the general appearance of the garden. One year the rear path was bordered by sunflowers and the front path by pansies. Different groups of students are assigned to the care of these plants.

The work is designed somewhat as a recreation, therefore the record keeping has been reduced to the minimum. Still we have had some serious objects in view. Among these have been: best flowers and vegetables suited to a northerly climate, comparison and selection of varieties, study of plant diseases and insects, soil conditions and fertilizers. Some of the special experiments have been: nitrate of soda for half of the plants, nitrogen cultures for beans and clovers, formalin for potatoes.

In our care for orderly arrangement and neatness we aim at the improvement of grounds around the rural schools to which many of the students go as teachers.

A garden for the training of teachers of nature-study. Johnson (Vt.) Normal School.

The school-garden has revived much interest in the cultivation of plants. Though Vermont is quite prosperous agriculturally, there are some communities where there is need of new life to break up the industrial stagnation which has crept into the less populous districts of the state.

For two years a school-garden was kept by the children of the Training School. A description of this garden and its aims has been published by the State Department of Education and can be secured by writing to the Superintendent of Education, Montpelier, Vt.

SCHOOL-GARDENS OF CLEVELAND, OHIO

By LOUISE KLEIN MILLER

Curator of School-Gardens

The school-gardens of Cleveland were the direct outgrowth of the work inaugurated by the Home Gardening Association. They were organized about three years ago under the auspices of the Home Gardening Association and Board of Education, but last year the Board organized a Department of School-Gardens, under the direction of the Curator of School-Gardens.

There are various avenues of work. The home-gardens are made from penny packages of seeds sold by the Home Gardening Association. Annual flower shows are held in the various schools to exhibit the season's harvest of flowers and vegetables. Year after year there is a marked improvement in quality of products, demonstrating the fact that the children are increasing in intelligence and skill. The Home Gardening Association and interested friends have always given bulbs for indoor and outdoor planting at the schools, and last year Judge Dellenbaugh presented a Catalpa speciosa to each school that had a flower show.

The home gardens are not under supervision, although many of them are visited during the summer. The practical instruction in gardening is given in the school-gardens, and we have found that the influence is far-reaching, The preparation of soil, planning, laying out of the garden, artistic arrangement, harmonious color effects, succession of flowers and vegetables, all appeal to the children's appreciation of the eternal fitness of things, and a more rational, systematic arrangement of the home-gardens is the consequence.

Before the seeds are sold to the children in the spring, a series of stereoptican lectures is given by the Curator of School-Gardens in the various schools, and such pertinent suggestions and recommendations made as shall be conducive to the most intelligent and effective work.

There has not been the stability in the school-garden work that is desirable, because in many instances we were obliged to depend upon property loaned for the purpose. The Board of Education

has acquired property which makes it possible to do work of more permanent value. The conditions at Rosedale School are probably most propitious. There is space for a large lawn, play-ground and school-garden. For educative purposes, the garden is divided into a rock garden, formal flower garden, vegetable garden, herbaceous botanical garden. As this garden was visited by thousands of visitors, it is hoped there was something suggestive for

At a school-garden in Cleveland, O. Studying corn, especially its pollination.

home-gardens. There was the most fascinating succession of blooming: fox-gloves, columbine, Canterbury bells, larkspurs, poppies, lilies,—— to the boltonia and hardy chrysanthemums when the snow fell. Likewise, the vegetable garden is always full of interest.

The botanical garden should be a Mecca for pilgrimages for all high-school students of botany. The food-producing plants will be of especial interest to children studying commercial geography and domestic science. There will be something of interest for each child, from the lowest grade through the high school.

Plans are being made for the establishment of an arboretum of trees and shrubs which will serve as a propagating center for students who will take up landscape gardening, arboriculture, horticulture and elements of forestry. The nurseries will also supply trees and shrubs for the improvement of school grounds.

A laboratory will be equipped at Oakland School, a manual training and domestic science center, where the children will learn something of the air we breathe, the chemistry of the water we drink and soil beneath our feet. Simple exercises will be given which will make the children familiar with the most important chemical elements of great importance in gardening, horticulture and agriculture. The students in domestic science will be interested in studying the compounds which make up the plant structure and which have been organized in the life-processes of the plants, into starch, sugar, oil, protein, fiber, cellulose; and furnish food for man and animals.

The adaptation of roots, stems and leaves to the soil, shedding moisture and arrangement to sunlight afford some of the most interesting problems in nature-study.

The color, form and arrangement of flowers in their adaptation to insect enemies and friends, the gradual transition from flower to fruit, the death of one generation giving birth to another, provides a series of observations which can not be anything but inspiring.

OUR EXPERIENCE WITH A SCHOOL-GARDEN

By M. A. BIGELOW

Teachers College, Columbia University

Eight years ago, Miss Elizabeth Carse, then supervisor of nature-study in the Horace Mann School of Teachers College and now principal of a private school in New York City, laid out a small school-garden (about 14 by 60 feet) on a lot adjoining Teachers College. Two years later the purchase of more land made it possible to add a second plot of 80 by 100 feet. Four years ago we added a third plot of 90 by 120 feet and built a very plain greenhouse, 18 by 40 feet. Now the erection of a new building has taken away the third plot and we must again be content with the first and second plots. These, too, will probably be required for a building before many more years pass.

The conditions in the Horace Mann School have never been ideal for a typical school-garden. The school year omits June and September, the great months for making gardens and for garden studies. The pupils are not in the city in the summer and so most of them plant seeds in May and next see their gardens late in September. Thirty or forty pupils who attend a summer session of the Speyer School are able to make good use of the garden in midsummer, both planting for themselves and helping cultivate plots planted by other classes in May. Throughout the year we have a gardener, who does the greater part of the work in caring for the garden.

The following points have been most interesting to those who have observed the work in our garden:

1. Obviously the usual claims for value in garden work do not apply to pupils who do not see their gardens between seed-sowing and harvest. Nevertheless we have felt convinced that the work of planting teaches lessons important enough to justify the gardening.

2. We have found the greatest value in the abundant material available for study in the autumn months. To this end we have learned to select late-maturing varieties and in some cases have the gardener start a late crop of certain vegetables, like radish, so as to have materials for study in September and October.

Garden of the Teachers College Schools in New York City, in August. 200 by 210 feet.

3. We have found great value in plants, such as geraniums, started from cuttings in the spring and in the autumn transplanted from garden to window-boxes and there kept all winter.

4. So far as the pupils' studies of gardening are concerned, we have found that our greenhouse and our window-boxes offer a very satisfactory substitute for the gardening which we miss between May and September. In the greenhouse and in the window-boxes the pupils follow many plants to maturity. To our surprise we have found that many old-fashioned flowers, (such as zinnias and phlox) and very common vegetables (such as radishes, squash and beans) are excellent greenhouse plants for educational purposes.

5. We have found it more desirable to encourage class ownership rather than individual ownership of the small garden plots. It early proved impracticable to allow many kinds of plants in a bed, because it rendered the gardener's work of cultivating too difficult in mid-summer. We, therefore, decided to mass varieties whenever possible. This also gave a wider range of materials for study, e. g., one class of thirty pupils has as many beds each with a difficult variety of vegetable.

6. We have learned that some plants with large seeds(sunflowers, beans, corn, nasturtiums, four-o'clocks), or bulbs, or easily-grown annual flowers (such as marigold and zinnia), are best for the small children. We have preferred to give the small-seeded flowering annuals to third-or fourth-grade children. They have suceeded splendidly with dwarf larkspur, California poppy, petunia, verbena, phlox, cosmos, mignonette, centaurea, alyssum, ageratum, calliopsis, cockscomb.

7. After many trials, we have come to prefer beds about 40 by 72 inches with paths 24 inches wide on sides and 18 inches on ends of beds. Even small pupils can easily reach to the center of each bed. We have rows about 10 inches apart so as to allow the gardener to expedite his work of cultivating with the scuffle hoe.

8. We have come to believe in the manual training value of preparing beds neatly, but it is often impossible to get satisfactory results when the work must be rushed in the last two weeks of May. The children naturally tend to get seeds planted in the shortest possible time.

9. We have come to believe that the greatest value of the school-garden for most schools is as a demonstration garden

teaching the children so that they can make home-gardens. These latter have been possible in only a very few cases among our pupils because of the crowded conditions on Manhattan Island.

10. Some experiments made by our graduates who have worked on school-garden problems outside of New York suggest that the "committee system" is the best way of keeping the school-garden in shape during the long vacation. A committee of pupils should be appointed for each week of the summer and report when the next school year opens. Of course, everything depends upon the organizing powers of the teacher.

A CORRECTION

In the paper by Professor Stanley Coulter which was published in the January issue of this magazine, part of a sentence on page 12 was in some unexplained way changed after the manuscript left the author's hands and much of the force of the paragraph was lost. The last sentence in the paragraph should have read as follows: "It is difficult, however, for one to see why, if the habits of life, the food-gathering and food-storing, the architecture and activities of the animal known as the ant constitute valuable and interesting nature-study material, the habits of life, the food-gathering and food-storing, the architecture and activities of the animal known as man should not furnish equally valuable and interesting material."

As printed it read: "It is difficult, however, for one to see why the habits of life, the food-gathering and food-storing, the architecture and activities of the animal known as man should not furnish material as valuable and interesting as do other animals." [EDITOR.]

THE AMERICAN NATURE-STUDY SOCIETY

A conference on the training of teachers of nature-study (in the broadest sense) will be held at Cleveland, Ohio, on the afternoon of July the third, which is the last day of the meetings of the National Education Association. This conference will be under the general direction of the A. N.-S. S. Committee on General Principles and the training of teachers of Nature-Study. The personnel of this and other committees being arranged by the Council will be announced when certain correspondence is completed.

The Council has decided that the next regular meeting is to be held in Baltimore next December when the meetings of many scientific societies will bring together more of the active members of the A. N.-S. S. than could attend at any other time and place possible for this year.

NATURE-STUDY LESSONS OBSERVED

Reported by M. A. BIGELOW

The following is a careful report of two nature-study lessons which were given in one of the New York City private schools last September. It is not made up from lesson-plans, but has been written out from notes made during the progress of the lesson and dictated to the editor of THE REVIEW on the same day. It is highly desirable that such reports, stenographic if possible, should be made of some typical lessons. Such accounts of what has actually been done will help many teachers much more than could any theoretical discussions or outlined plans.

The apparatus at hand for the lesson consisted of small wine-glasses, one for each pupil, and hand-lenses. Each glass was filled about half-full of water and contained a number of larval mosquitoes. There were ten or twelve pupils in the class, which was a fifth grade with pupils averaging about ten years.

The teacher introduced the lesson by saying: "Today we are going to study the life-history of mosquitoes. We are going to keep the mosquitoes in these glasses and watch them carefully as we have already watched the life-history of butterflies. The specimens which you have in the glasses are obviously not full-grown mosquitoes but they are immature larvæ. What is the common name for the larval stage of the butterfly which we have already studied? (Pupils answer, "caterpillar.") The problem for this day is to find out how this mosquito larva moves in the water, what it does in eating, feeding and moving. First look for the head-end, then the tail-end, then more carefully for the structure of each and find out how each is used. Also look at the arrangement of hairs, feelers, eyes and such things. First, now, see how the animal moves and in a few minutes I will give you a chance to report to the class."

After a minute or two of careful looking at the specimens in the glasses several pupils were ready to report. This first answer was typical: "The larva starts from the bottom to the surface, wiggles his body, usually keeps the head-end first, and when he gets to the surface he turns around and sticks his tail-end out of the water." After some more watching, most of the pupils in the class agreed that these were essentially the things which they

saw. The teacher then said, "Look again carefully and when the larvæ come to the surface, jar the glass and see what they will do." The answer from the pupils was, "When the glass is jarred the larva falls to the bottom and does not have to wiggle down." Then, after more watching, some pupils reported that "sometimes the mosquito comes to the surface and bites his jaws together." At this point the teacher looks at the specimens to verify this statement heretofore unknown to her. A pupil then asked, "Why do all the larvas hang at the surface of the water with the tail-end out?" The teacher replied, "Look carefully and think of something which all animals must do. Is the larva eating with its tail-end?" In a moment the pupils replied "no." Again the teacher questioned "what else besides eating must animals do in order to live?" Several pupils replied, "Breathe," and suggested that possibly the larvæ were breathing at the surface of the water. The teacher told them that scientific men had found that this was true. One pupil remarked, "Isn't the tail a funny place to breathe?"; and another one said, "You couldn't drown a mosquito by holding his head under water because he could stick his tail out to breathe, and another one remarked, "You couldn't drown a caterpillar either by sticking his head under water because he breathes all along the sides of his body." At this point the teacher showed them how to transfer a larva to a watch-crystal and how to examine it with a small hand-lens with a tripod support. After looking carefully for a moment, various pupils reported that there were "rings" on the body, "whiskers" as they called the hairs, "more whiskers on the big ring next to the head," and "black lines inside of the body from head to tail." The teacher here explained that these lines represented the food-tube. Pupils next saw feelers and eyes on the head. The teacher asked about the size and the pupils reported that some were smaller than others. The teacher asked why; and some pupils suggested that caterpillar larvæ, which they had studied, were at first small and after eating for a long time became large.

After thus noting the more striking features of the animal's structure, the pupils were instructed to make sketches. Examination of their sketches afterward showed that some were life-size, some were three or four times the life-size, some represented a wine-glass with the larva at the surface of water and there were many other variations due to the fact that the pupils were left to

their own ways of drawing. This was the close of the lesson. The teacher instructed them to cover their glasses with pieces of mosquito-netting, held in place by rubber bands, and told them that the glasses would not be touched until the next lesson which was to occur two or three days later. The time of the lesson was approximately thirty minutes.

At the beginning of the second lesson it was to be noticed that pupæ had developed from some of the mosquitoes under the netting, and it was evident to the pupils that these must have developed from the larvæ which had been studied and left in the glasses at the end of the first lesson.

The teacher began the lesson by asking, "Have your larvæ changed since the last lesson?" The first answer was typical of a number: "We have in the glasses some things which are black with queer, hunched-up backs." The teacher said, "These are called pupæ. Look carefully and tell me what you see." In a moment came the answer, "The pupæ float up like a balloon, but they have a mighty hard time getting down." Another pupil said, "When they get down they paddle and paddle and when they stop paddling they shoot up to the surface." The teacher asked, "Do they stick their tails out at the surface as did the larvæ," and in a moment several pupils replied, "No, they stick their hunched backs out." The teacher said, "Look carefully at this back." A pupil replied, "I see two horns." The other pupils verified this observation. The teacher asked them what these horns might be for and several pupils in chorus answered, "For breathing." Other remarks showed that the pupils inferred this because the tubes projecting out of the water in the larva stage were used for breathing.

The teacher instructed the pupils to watch for eating. There were no results. The teacher asked, "Do the pupæ of butterflies eat?" A pupil replied, "No, for those pupæ are quiet and do not need to eat, but these pupæ are moving and need food to keep them going." Another pupil remarked, "Bears do not eat in winter when they curl up and go to sleep." The teacher explained that an active pupæ stage could exist without food because of its short duration.

Then the teacher poured some of the pupæ out into watch crystals and used a hand-lens as in the first lesson. Various pupils reported that they could not see a head. One of them

said, "The animal is all one hunch and six or seven rings and a big pair of paddles." Another one reported, "There's no breathing tube like the larva has on its tail." Another pupil saw two tubes on the hunch of the back. Others saw eyes. All looked to verify these points. The teacher said, "I wonder why pupæ stay at the top." After looking a moment one pupil said, "It would be better to stay down in the mud so that other animals can not eat them." Another pupil said, "I think that is why they wiggle down when we jar them." Another pupil said, "I think the pupa stays at the top most of the time so the mosquito won't get drowned when it comes out." Another pupil discovered a mosquito sitting on its empty shell, and others looked to see the same. One little girl remarked, "Goodness, you would not think there was so much to nothing but a mosquito, would you?" Another pupil said, "If the mosquito flies in the air, how does the larva get into the water?"; and quick as a flash another pupil answered "the lady mosquito lays the eggs in the water." (The pupils were convulsed with laughter.) At this point the teacher replied, "We will keep the mosquitoes penned up in some of these jars and will watch for eggs." The pupils made some sketches in their note-books and at this point the second lesson closed. The time was about thirty minutes.

It is evident from many points in the foregiong outlines that the pupils had had an earlier lesson on the adult mosquito.

To the observer the most interesting thing was that it was a lesson largely conducted by the children, for there was very little talking on the part of the teacher. As shown in the report above, the teacher's remarks were chiefly in the line of setting problems in order to direct the observation of the pupils, and it is obvious in many places that there was plenty of opportunity for expression of originality on the part of the pupils. There are some points in this lesson, which are open to criticism, but on the whole they have some excellent points. If others have different views they are invited to send them to the editor of THE REVIEW for publication.

Perhaps other readers of this magazine will be able to give reports of especially interesting lessons which they have observed.

INTEREST OF SCIENTIFIC MEN IN NATURE-STUDY

The following extract is from the address of Professor McMurrich before the American Society of Naturalists at the recent Chicago meeting. The remarks here quoted followed a discussion of various ways in which the Society could be of value to scientific movements.

"Do we as a body of working biologists properly understand the conditions of science-teaching in the schools, and have we shown sufficient interest in bringing it to that state of efficiency which its importance demands? In later years a wave of nature-study has passed over our primary schools, driven by Froebelian breezes. But, unfortunately, in many schools it seems that the Froebelianism which should blow as a gentle zephyr has been permitted to increase to a hurricane and the wave of science study, instead of being an educational blessing, has carried devastation on its crest. Two of our members have accomplished much by their endeavors to establish nature-study upon a proper basis and their work deserves a greater meed of credit than it has hitherto received. But even yet, so far as my observation and information extend, the teaching of nature-study is in many schools in the hands of inefficient instructors, untrained in the methods and purposes of such instruction, and the result is a minute crumb of solid food overlaid by a heavy coating of mawkish sentimentality. The principal aim of nature-study should be to train the child to the observation of natural objects and phenomena and to awaken in his mind a healthy curiosity as to their meaning and significance. In other words, its purpose should be to develop in the child the scientific spirit, which is not inborn but requires development. Its primary object should not be a directly utilitarian one and it should certainly not be used as a means of evoking an unhealthy and unnatural sentimentalism when no sentimentalism should exist. Surely in a search for the sentimental, nature is the last place to which we should turn. Perhaps the causes of the mistakes in nature-study are largely due to conditions which are beyond our control, but have we done our duty in upholding the hands of our fellows who are striving for efficient instruction, in calling the attention of those in authority to errors in method, and in endeavoring to set science teaching in the primary schools upon a proper basis?"

NOTES ON NEW BOOKS

Biological Projection. Professor A. H. Cole, of the Chicago Normal School, has for many years been experimenting with projection apparatus as a means of illustrating the study of living plants and animals. His results are incorporated in a book entitled "Manual of Biological Projection," published by the Neeves Stationery Company, Chicago. The book gives very complete accounts of the various kinds of projection apparatus and their management, and also very complete directions for exhibiting living animals and plants. Especially interesting are the suggestions for anesthetizing animals which are so active that in the normal condition they could not be exhibited by means of projection apparatus. Very many of these suggestions would be useful for work with an ordinary microscope. Mention should also be made of the chapter which gives directions for collecting many species of animals or plants and for keeping them alive in aquaria. This chapter will be of value to many teachers who do not use a projection microscope.

General Physiology. The tendency in recent years has been to teach human physiology in close connection with the biological sciences in our high schools, rather than as an isolated topic concerned solely with the human body. In other words, physiology is being taught as general physiology, drawing a large part of its material from various animals and plants. To meet the demand for such a general treatment of physiology, Dr. W. H. Eddy, of the New York High School of Commerce, has prepared a text-book, which has been recently published by the American Book Company. Throughout this book he has laid special stress upon the physiological processes; and while retaining the human body as the main subject of application, he has attempted to teach the universal application of these processes to all living matter. It would be possible to use the book not only for the study of the human body, but also for a supplementary text in the study of zoology and botany. It is intended to be used as supplementary to laboratory study, such as is outlined in the "Experimental Physiology and Anatomy" by the same author. Such a book deserves very careful trial by good teachers, because its general arrangement indicates that in practice it will be found far superior to the usual treatises limited to human physiology and anatomy.

New Elementary Physiologies. In an article published in this magazine in February 1906, page 67, it was pointed out that the great difficulty with our present instruction in physiology and hygiene for elementary schools arises from the fact that in presenting the subject every year, beginning with the Third Grade, there is a large amount of useless and tiresome repetition in all of the series of text-books which have been prepared to meet the legal requirements. Especially has there been much repetition because authors have attempted to cover the entire subject in each book. Professor L. H. Gulick, Director of Physical Education in the New York City Schools, has attempted to overcome this difficulty by preparing a new series of text-books, published by Ginn & Company. In

order to maintain the interest and avoid the effect of annual review of the same subjects, Professor Gulick has endeavored to supply for each year some distinctive and separate topic in hygiene. For example, in the first volume ("Health") some very simple hygiene of the skin is presented. In the second volume ("Emergencies") such things as burns and scalds are discussed. In the third volume ("Town and City") the skin is presented as a conveying agent. In the fourth volume ("Physiology") the general functions of the skin will be discussed, and in the fifth volume ("Control") the skin will be discussed as a nervous organ. Thus there are five different phases of the subject. This is certainly an interesting attempt at gradation of the subject-matter of physiology and hygiene. Probably more interesting and more important than this is the fact that the author has found it possible to say very little about internal organs in the first four books of the series, and this will meet with the hearty approval of very many teachers of science whose experience has led them to doubt the advisability of discussing internal organs very extensively with young pupils below the seventh or eighth grades. The books deserve careful consideration by teachers, because they evidently contain many suggestions which may help in solving the present problems connected with physiology and hygiene in the elementary schools.

NATURE-STUDY AND SCIENCE NOTES

[EDITOR'S NOTE. This department will be conducted by Chester A. Mathewson, of the High School of Commerce, New York City. Notes and suggestions may be sent to him in care of the editor of THE REVIEW.]

"The Country Boy" is the appealing title of a leaflet issued by the Massachusetts Civic League. The author is George E. Johnson. He calls attention to many things now done for children in cities, and points out that the needs of the country child are no less pressing.

"The free plays of the earlier years are continuing, on a larger, more venturesome scale. Passion for nature, which lies in every normal child's breast at this age [8 to 10 years], impels him to press beyond his former narrow bounds. He must search the earth and appropriate what he finds. It is the beginning of the apple-stealing period. This passion for nature, if rightly guided, will lead to a higher and better appreciation of the world and of his own relation to it. But this passion needs direction, needs a headquarters for information and inspiration. Only rarely is such furnished the country boy, who, therefore, often remains impoverished amidst incalculable wealth and opportunity. The country play-ground can easily provide a 'back-yard fish-pond,' aquarium, insect cages, aviary, and menagerie, which would furnish more information, interesting study, and incentive to look for things, probably, than the city park and menagerie can furnish city children, because the former fall directly in the line of the child's activities and experiences, and because they are largely of his own creation. But, without these aids and wise direction of the passion for nature, the vast majority of village boys miss entirely the scientific interest, loving appreciation, and moral inspiration that ought to result

from contact with nature. The passion for nature finds expression in seeking, maiming, killing, destroying. Wild flowers are greedily and ruthlessly gathered, creatures are chased and slaughtered, in a kind of impetuous savagery. It is so easy to change all this. Dr. Hodge's experience with Worcester children in the matter of toad killing is a notable illustration. In "Nature-Study and Life" he says:

"While walking once around a small pond I counted two hundred toads dead or mangled and struggling in the water, and learned next day that two boys had killed three hundred more, carrying them off in an old milk can to empty on a man's doorstep. This five hundred does not represent probably one-tenth of the number killed by the children that spring (1897) around this one pond. A "civilization" in which such abuses of nature are possible ought to be eaten alive by insects, and something must be fundamentally wrong with a system of public education that does not render such a thing impossible. My first impulse was to get a law passed and appeal to the police; but the wiser counsel of a friend prevailed, and I was inclined to try education of the children instead. Accordingly a prize of $10.00 was offered to the Worcester school-child who would make the best practical study of the "Value of the Common Toad." This was offered March 31, 1898, and there was no evidence that a single toad was harmed at the pond the following April and May."

Wolves and Coyotes in the West have caused enormous losses to live-stock interests in the past. The offering of bounties for predatory animals has proved quite inadequate to ridding the western country of the animals which, in Oregon alone, caused a loss of $250,000 in 1907. The U. S. Forest Service, in a recent circular, states that trained hunters and systematic campaigns are the only means which avail in any considerable degree to protect a given region.

Instruction in Agriculture is now given in the normal schools of twelve states in the Union. Seventeen states have one or more public high schools giving such instruction.

Nature-Study in Country Schools. O. J. Kern, of Illinois, in a recent number of the *Western Journal of Education*, says: "For inspiration in my efforts to create a new ideal with reference to the beautiful in country life, I am indebted to various agencies given below, though not necessarily given in order of importance.

1. Bulletins issued by the United States Department of Agriculture, especially the ones issued by the Bureau of Plant Industry and the Bureau of Forestry.

2. Publications of the American Park and Outdoor Art Association.

3. Literature and pictures given by the Youth's Companion Publishing Company.

4. Various magazines like *Country Life in America*.

5. Arbor and Bird Day manuals issued for the past six years by the state superintendents of Iowa, Indiana, Nebraska, Wisconsin, and Illinois. Those of Wisconsin have been especially helpful.

6. Books like Babcock's "Bird Day"; Ely's "A Woman's Hardy Gar-

den," Miller's "Children's Gardens"; Blanchan's "Nature's Gardens"; Dugmore's "Nature and the Camera"; Hemenway's "How to make a School Garden"; Roth's "First Book of Forestry"; Robert's "The Heart of the Ancient Wood"; Roger's "Among Green Trees"; Miller's "The Brook Book"; Gibson's "Eye Spy"; Burrough's "Pepacon"; and many others.

7. A closer study of road, stream and field in my own county of Winnebago. There is much of beauty in each school district which the children do not yet see. If they do see it, they are like the lad who said to me a few days ago (when we were discussing Bryant's "What Plant we when we Plant the Apple Tree?"), in answer to the question about the beauty of common things. "We may see the beauty, but we don't think of it." This was from a boy ten years old. I feel sure that teachers can get an inspiration from some one or more of the above sources, which will lead them to see and think more of the beauty of common things."

The Home Gardening Association of Cleveland has issued its eighth annual report in the form of a handsome booklet containing many splendid half-tone illustrations of various phases of school and home gardens. Most of the work of this organization is done in Cleveland, but it extends its influence all over the country by means of the penny packets of seeds which it sells. In 1907 the Association sold 546,946 packets, of which over fifty per cent went to schools and organizations outside of Cleveland. During 1908 these packets can be secured from the Cleveland office at one cent each. They offer a choice of eighteen flowers and eight vegetables.

Anopheles in Sea Water. Dr. L. O. Howard gives in *Science* a summary of an article by Dr. Vogel, of the Dutch East Indies, in which are the following interesting and extremely valuable conclusions: 1. There are species of Anopheles which can live very well in sea water. 2. These mosquitoes lay eggs which develop even in sea water which has been evaporated to half its original quantity. 3. These larvæ in the gradually evaporating pools of sea water can stand an evaporation of the water to one-third of its bulk, but do not appear to transform to adults if the concentration be greater than this. 4. The larvæ coming from eggs laid in sea water of high concentration can accomplish their entire metamorphoses in almost the normal time. This is true even when the water has such concentration that the development of larvæ originally hatching in unconcentrated sea water, would be retarded by this salt water.

Not only are these observations of great interest as bearing upon the health of certain sea-coasts, but they have an important bearing in possibly explaining the cases of malaria observed upon sailing vessels that have not made port for months, since it indicates the possibility that Anopheles may breed in the bilge-water of such vessels. In such cases it is only necessary that one of the sailors should have gametes in his blood in order to start an epidemic of malaria aboard the vessel. The bad reputation which the coral islands of farther India have is explained by Doctor Vogel's observations, since so many cases of malaria are observed along the coast during the dry season when all the rivers and fresh-water streams are dried up.

The proposed destruction of Anopheles by the introduction of sea water seems not to be rational.

Shields' Magazine. The recent numbers of this magazine have continued the good fight for bird and game protection. Mr. Shields is doing a good work and his magazine deserves far better support than it has so far received. If any readers of THE REVIEW know real boys of 15 to 20 years who are interested in hunting and fishing, do not fail to order Shield's Magazine for them. It will be good nature-study for the boys and soon will enlist them in the cause of game protection.

St. Nicholas for January has some interesting notes in the "Nature and Science for Young Folks" department; especially the illustrations of snow images of animals made at Andreasburg, Germany; and the account of the large pigeon farm at Los Angeles with 100,000 birds and selling 1,000 dozen squabs per month, bringing a gross annual income of more than $30,000 a year.

Bounty for Cats. In his annual report the Secretary of the Pennsylvania State Game Commission recommends that the house cat be added to the bounty list, because it is such a great destroyer of bird life.

Sesquipedalian Words in Science. A recent critic (See *Science*, Dec. 27, 1907, p. 909) calls attention to an article on ants in the December *Popular Science Monthly* as "an attempt to parade an aggregation of inane verbosity." Most of the examples cited, like symbiosis and polymorphism are useful scientific words; but when the average man reads in this article that "Slavery or dulosis is rare among ants" and then looks up dulosis to find it simply a Greek synonym for slavery, he is inclined to agree with the critic in the suggestion that science men introduce such words "to show that the author has some knowledge of Greek" or wishes "to clarify his meaning and make science popular." It certainly reminds one of the text-books which read: "The crayfish has a beak called rostrum and legs called ambulatory appendages."

Humor in Nature-Study. The funny man has seen possibilities in the line of nature-study and his publisher now offers "Nature Series, No. 23, How to Tell the Birds from the Flowers." The publisher is not engaged in the text-book business and hence we need not fear that the book will be adopted for regular work in schools.

Economy in Christmas Trees. Those interested in forest preservation will be glad to learn that, probably owing to business complications, the New York City wholesale dealers ordered 65,000 less evergreen trees than last year.

Dandelions as Food. This despised weed seems to be steadily gaining ground as an edible and in the Old World is frequently cultivated. In the markets of our larger cities the cultivated dandelion is often exposed for sale while in smaller towns the plants that grow so profusely in waste grounds are not disdained. But even in so apparently simple a matter as cooking dandelions there seems to be some tricks. The majority simply cut off the leaves, wash them and cook until tender. A better way is to

select the large plants and after digging remove most of the green part of the leaves and all of the root except just enough to hold the leaves together. The lower part of the leaves are blanched from being in the ground and are sweet and tender. They should be washed thoroughly, parboiled for a few minutes and then cooked as usual. [*American Botanist*]

Mosquito Extermination. The New York Legislature has passed a law which confers upon local boards of health the power to declare breeding places of mosquitoes public nuisances. The owner of the property upon which such conditions exist may be required to abate the nuisance at his own expense. If the owner fails to take action the law empowers the local board to do the work, assessing the cost equitably on the abutting property.

Study of Trees in our Primary Schools. This is the title of an elaborate quarto volume of 48 pages prepared by Professor C. M. Weed for the Massachusetts State Forestry Department (office at Boston). It contains detailed directions for the study of selected trees during the first three years of the primary school. The following principles of selection are laid down by the author: (1) To select for the youngest pupils the most diverse forms so that the visual images will be distinct and easily differentiated. (2) To include in some cases related forms which have points of difference easily grasped by young pupils. (3) To include as many trees as practicable which may be utilized in sense impressions through feeling or smelling, thus reinforcing the visual images. Suggestions are made for drawing, modelling, coloring and printing leaves, for excursions, and a sample lesson is given.

Quail and Woodcock. The November 1907 number of the "Nature Guard" contains a very interesting account of the habits of these valuable game birds.

Sugar-Beet Industry in the United States. One of the "Farmers' Bulletins" states that ten years ago the consumption of sugar in this country amounted to almost 2,000,000 tons, or 62 pounds per capita, annually. Of this amount over 1,500,000 tons came from abroad. The Department of Agriculture deplores the necessity for this enormous importation and has worked hard to learn whether it is possible to produce more in this country. The experiments have shown that there are wide areas in the United States adapted by soil and climate to sugar beets.

Mushrooms as Food. There is a widespread idea that mushrooms and other edible fungi are very nutritious foods. They are commonly said to contain very large quantities of protein (nitrogenous material) and to rank close to meat as sources of this important nutrient. The term "vegetable beefsteak" has been applied to them, and other equally extravagant statements are frequently met with.

An extended study of the food value of edible fungi has recently been made at Yale University. Analysis does not show that the edible fungi (mushrooms) possess a high food value. The following conclusions are deduced from the comparative tables of analysis.

It will be seen that the mushrooms contain a very high percentage of water. In ordinary food materials protein is the most important nutrient.

As regards protein content, the mushrooms rank about the same as potatoes, though they are decidedly inferior in food value, since they contain much less carbohydrates. Non-albuminoid nitrogen is thought to have little food value. As will be seen, the mushrooms do not contain a high percentage of nitrogen, and a considerable portion of the nitrogen present is in the form of non-albuminoids.

When it is remembered that mushrooms contain 75 to 92 per cent of water, and that the total amount of protein present is comparatively small, it will be seen that they correspond with fresh vegetables. Indeed they are decidedly inferior to many vegetables. The expression "vegetable beefsteak" seems peculiarly inappropriate when applied in a strictly chemical sense. A person depending upon mushrooms to furnish the amount of protein necessary in a day's diet would be compelled to consume about 8 pounds, if the morel, a fair average species, were selected. The carbohydrate content of mushrooms is relatively high, but there is no lack of carbohydrate foods in the ordinary diet, and consequently, no great need for this constituent of the mushrooms.

Although mushrooms and other edible fungi can not be considered as highly nutritious foods, they are undoubtedly useful condiments or food accessories. They add to the palatability of many food materials when cooked with them, and may be served in many appetizing ways. Their use can undoubtedly be extended by skillful growing and careful marketing. The principle edible fungus raised by market gardeners is the common field agaric (Agaricus campestris), and the term mushroom is generally understood to mean this variety.

Although the number of wild edible fungi is comparatively large, there are many poisonous varieties, and too great care can not be exercised in gathering fungi for food.

Criminal Animals. In *McClure's Magazine* (February) Dr. W. T. Hornaday has an interesting article on this topic. The following criticism from the *New York Times*, well expresses the doubts which many psychologists must have concerning extremely human interpretations of animal actions.

"Mr. Hornaday has a curious theory to the effect that, just as men show their real nature only when tried by adversity, so the mind of the animal is revealed only in captivity, and those who have studied animals in the wilds alone have no conception of their psychological possibilities. The one proposition is probably as sound as the other, and neither needs serious consideration. The point Mr. Hornaday tries to make is that, while animals in a state of freedom are a virtuous lot, when prisoners they develop a large capacity for what he calls crime, and he presents many anecdotes in demonstration of his thesis.

They are excellent stories, and of all exactness, no doubt, as to the exact order of events in the several tragedies of cage and paddock, but Mr. Hornaday's interpretation of the events is—well, rather desperately anthropomorphic. He sees deep-laid and malignantly executed plots to murder where others will see only the manifestations of chronic or acute

brain disease, due to confinement in artifical conditions, and he charges with criminality poor beasts that did their poor best to obey instincts upon which the perpetuation and progress of their race have depended for centuries. Of all the tales he presents, that in which Black Beauty, a buffalo, "murders" Apache, an interloping rival for the overlordship of the herd, best illustrates the laborious bringing from afar of a complex human explanation when a simple animal one was close at hand."

NEWS NOTES

The Graduate School of Agriculture will hold its third session July 6–31 at Cornell University, Ithaca, N. Y., under the auspices of the American Association of Agricultural Colleges and Experiment Stations. Instruction adapted to the needs of graduate students will be given under the general heads of biochemistry, agronomy, horticulture, dairy husbandry and dairying, poultry, veterinary medicine and entomology. Prominent specialists in these lines will have charge of the instruction.

Lecture periods of one hour each will be provided for, principally in the forenoon during five days of each week. After each lecture period there will be an open period of a half-hour, which may be used informally for answering questions asked by individual students, etc. In the afternoon seminars or demonstration exercises will be held for about two hours, five days in each week.

By vote of the Association of American Agricultural Colleges and Experiment Stations a matriculation fee of ten dollars will be charged for the whole session or any part thereof. No laboratory fees will be charged. Board and room may be obtained in the neighborhood of Cornell University for from $6.50 to $8 a week.

All correspondence relating to membership in this school should be addressed to Prof. G. N. Lauman, Registrar, College of Agriculture, Cornell University, Ithaca, N. Y.

A prospectus giving a complete schedule of courses and instructors and other information will be issued later. A. C. True of the U. S. Department of Agriculture is the Dean of the School.

Dr. Mary Wood-Allen, the well known author of books and leaflets for instruction concerning sex physiology and editor of "American Motherhood," died recently at a sanitarium in Washington, D. C.

Prof. Austin C. Apgar, of the Trenton (N. J.) Normal School died early in March. Professor Apgar was a naturalist-teacher of the old school. Among his published writings the best known are the handbooks on birds and trees.

Summer Courses in Science will be given in most colleges and schools which have summer sessions. The compiler of these notes has received specific information from Cornell and Columbia universities, Cold Spring Harbor Laboratory, and Maine Biological Laboratory and the Lake Laboratory at Sandusky, O. Some of the institutions give information on the advertising pages of this magazine.

Bertha M. Chapman, for several years supervisor of nature-study at Oakland, Cal., has been appointed instructor in Professor O. W. Caldwell's department at the School of Education in the University of Chicago.

The Ohio number will be published for April. It seemed best to advance the present number, containing articles on gardening, to March.

"The Guide to Nature" (and to nature literature) is announced as a new monthly magazine for adults, "devoted to commonplace nature with uncommon interest." It will be the official organ of the Agassiz Association and edited by Edward F. Bigelow, well known as editor of the science department in *St. Nicholas*. The price is $1.50 a year. Publication office is at Stamford, Conn. Write for prospectus.

The following interesting note occurs in the Prospectus under the heading "Pedagogical":

"Down in your heart, haven't you become tired of so much one-sidedness in all this talk of 'nature-study' for the child in school? Is it possible, is it reasonable to suppose, that this beautiful world is so much more important for the little child than for the youth and the adult as one would infer from the deluge of books on the subject, and from the articles in the periodicals devoted to 'nature-study?' It is not reasonable, for we should never outgrow our childhood in this kindergarten of God, never cease to wonder and admire, and to learn.

For a few years the theory, the pedagogy, the arguments pro and con of nature-study in the schools, of nature-study that centers in the child, have been excellently presented in THE NATURE-STUDY REVIEW, and in connection with that publication there has recently been organized The American Nature-Study Association [Society.] All this is from the point of view of pedagogy and the child. *The Guide* proposes to supplement and aid by materials from the point of view of the teacher. Nature-study is progressing. Yet some teachers in their enthusiasm often ask why it does not progress faster, more generally, and come more extensively into general adoption. There surely is no lack of talk, of books, of theory, of argument on nature-study for the child. The greatest need at the present time is, in the opinion of the editor of *The Guide*, more teachers with greater enthusiasm, more teachers who believe and live the creed that nature-study and love of nature are in themselves worth while, regardless of any teaching to a child. In other words, to teacher and general public knowledge and love of nature should be more an end than a means."

IMPORTANT NOTICES

Payment in Advance. Hereafter this magazine will be published on a strictly paid-in-advance basis for two reasons: (1) The new rules of the U. S. Post-office Department require a higher rate of postage on copies to subscribers who are in arrears. This together with the clerical work involved in keeping such names on separate lists and sending bills makes it too expensive to carry subscriptions far in arrears. (2) Experience in the past two years proves that a surprising percentage of subscriptions ordered continued and to be paid later will not be paid. THE REVIEW

lost nearly $75 in this way last year, and also the cost of postage and clerical work in sending bills several times. Even a normal-school principal refused to pay because the "copies could not be found in his office," but he did not give this information until the fifth bill and a special letter called his attention. It seems impossible that all copies for two years could have strayed in the mails. Other subscribers have ordered the magazine continued and then removed to other places without ordering second-class mail forwarded. But the majority of delinquents—many of them personal or professional friends of the editor—simply forget the bills for unpaid subscriptions. This has been the experience of many other publishers.

The editor feels sure that the vast majority of readers will agree with him in the opinion that economy should be practiced by adopting a payment-in-advance rule. This has already been done by the American Nature-Study Society and other subscribers ought not to be carried on a basis which means, at least indirectly, increased expense for the Society.

Please examine the date on the address-label and wrapper of this issue and if you find no record of payment for 1908 sent more than three weeks ago, notify the Secretary of the A. N. S. S. at once. Otherwise, the April and later issues will not be sent to addresses marked 3–08 (March 1908) or earlier.

Incomplete Sets for 1907. Please report at once any numbers paid for but not received last year.

Index to Vol. 3 was mailed with the January numbers. If you did not receive a copy, please write at once to the New York office of this magazine.

Extra Copies of the Constitution and circulars of the A. N. S. S. are ready for mailing to members who wish to inform others concerning the work of the Society.

Reprints of Articles published in this magazine will hereafter be made for authors at a low rate if ordered when manuscript is mailed. Extra copies of THE REVIEW will be supplied to authors of articles free of charge if request is made before printing.

THE
NATURE-STUDY REVIEW

DEVOTED TO ALL PHASES OF NATURE-STUDY IN SCHOOLS

VOL. 4 APRIL, 1908 NO. 4

OHIO NUMBER

MANAGING EDITOR'S NOTE.—This number of THE NATURE-STUDY REVIEW has been prepared under the editorial direction of Professor Michael F. Guyer, of the Department of Biology, University of Cincinnati. All the papers were written by educators connected with Ohio schools and colleges.

This is the first of a series of numbers to be prepared under the direction of members of the Council of the American Nature-Study Society. The May issue will be a "California Number," edited by Dr. H. W. Fairbanks. Beginning in the next school year, there will be a "Canadian Number," edited by Professor Lochhead; a "Nature-Study and Industrial Education Number," edited by Professor O. W. Caldwell of the University of Chicago; a "Nebraska Number," edited by Dr. Ruth Marshall of the University of Nebraska; an "Illinois Number," edited by Professor F. L. Charles of the DeKalb Normal School; a "Minnesota Number," edited by Professor F. L. Clements; an "Indiana Number," edited by Professor Stanley Coulter; a "Southern Number," edited by Professor F. L. Stevens. These special issues are in preparation and others are being planned. In most of these issues there will be pages reserved for publication of notes, discussions, etc., which come direct to the Managing Editor; and therefore readers are requested to send in their communications as heretofore.

An article by Professor Hodge has been added as this issue goes to press.

ORGANIZATION OF NATURE-STUDY IN THE PRIMARY GRADES

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"We have not yet organized nature studies in the schools into any well knit adjustment to general education"—(Elmer Ellsworth Brown, "Are we an Inventive People in the Field of Education?" *Science*, N.-S., vol. 26, p. 5).

Nature-study is passing out of the stage of propaganda into the stage of appreciation. It has not proceeded much further. So far its progress has been due to individual rather than to organized effort. There is an irregularity in its use as a school subject which is not found in the use of other school subjects excepting, perhaps, manual training.

It is not unusual to find emphasis placed on nature-study in one grade and none at all in the next; or to find the same topic repeated in several grades by different teachers. An example of the latter is one of the stock subjects of the Thanksgiving season: the pumpkin.

The idea of the harvest, Thanksgiving day, turkey, cranberry sauce, and pumpkin pie, etc., has at this season a more or less prominent place in the minds of everyone from the youngest to the oldest. It is fitting, therefore, that the schools recognize and make use of the spirit of such a time.

But when the pumpkin is discussed in all its relations—seed, vine, color, fruit, and reasons found for its color, peculiarity of its pulp, special way of taking care of its seeds—in the first grade, and repeated with the same child in each of the three succeeding years or perhaps longer, one naturally feels that the pumpkin is receiving undue prominence. I sometimes wonder if such a procedure might not prejudice the child against the pumpkin and detract just a little from his enjoyment of the real functions of the pumpkin, viz., its use in pies, and for making jack-o-lanterns. I am tempted to digress a little, to suggest that if the energy of these four years could be lumped together in such a way as to have the child raise a pumpkin from the seed, harvest it and finally follow it personally into a jack-o-lantern or a pumpkin pie, the pumpkin would then have filled a happy mission as a nature-study subject.

There are at least two reasons for the irregularity just noted. One is the lack of direct interest in nature on the part of the teacher. If she teaches nature-study at all, she often gets her information from books, or mechanically plans her lessons according to a certain type familiar in primary lesson-plans. The other reason is lack of proper sequence from grade to grade, and year to year.

It is my purpose here to discuss the organization of nature-study for the primary grades (I–III), and to point out a few important principles which seem to me to underlie such a plan. In presenting this I have in mind chiefly the needs of the smaller school systems where no well planned work in nature-study is undertaken.

In the first place there should be a definite idea of the place and use of nature-study in these grades. "Training the powers (?) of observation" is most too vague; "learning to interpret nature" except in very simple relations is too difficult; and "instilling in the child a love of nature" is unnecessary for this love is already there in some form or other.

I have already indicated at another time[1] that two elements are greatly neglected in our elementary schools: (a) giving the child new experiences, and (b) creating in him wholesome interests outside of school hours. It is assumed that the experiences of the child before school age and outside of school hours are sufficient for him to understand whatever is presented to him in school. As a consequence his use of words far outruns his knowledge of their meaning. What they really represent may never come into his life sufficiently for him to understand them. I appreciate the fact that reading and language lessons are now planned to come as far as possible within the experience of the average child and that in this respect conditions are far better than a few years ago. But it must be apparent to every one interested in primary education that in spite of these carefully planned and well illustrated lessons they often go beyond the child's real experience. I found, for example, that the children of a second grade of a certain school in California knew the names of fourteen birds. But these words and some of the pictures illustrating them, and not the birds themselves, were the concrete objects to

[1] B. M. Davis, "School Gardens," this journal, vol. 2, pp. 82–83.

the children. On testing their actual knowledge none of the children knew by sight or song more than three birds, and most of them failed to recognize the linnet which is as common there as the English sparrow is in the east.

Without going further, we may assume that directing the child to new experiences in his natural environment—getting first hand acquaintance with the common things—is an important function of nature-study, and one that we may reasonably expect to be carried out in the average school. We may call this experience-getting or data-gathering. These data are mostly things that impress themselves upon the child through his senses and his own activities. The child proceeds somewhat as follows: He sees something and wants to handle it. He is often satisfied if he is simply allowed to hold it. But if he can come into a still more vital personal relation with it by having it serve him in some useful way, the experience is more satisfying and definite. Of the many things he learns in this manner he finds that some things are more useful than others. His activities in data-gathering for himself are therefore directed to the things that serve him best, and also through imitation to those that he sees serving others. Hence his first questions in the presence of something new are usually: "What is it for?" "What is its name?" "What does it do?" What the child is really trying to get at is whether the thing may be of use to him. The answer to these questions determine the value he sets upon it. He is not interested in details, however important they may seem to the adult mind. As the child advances in experience his gathering of data grows less promiscuous. There is a classification. Only those things are selected and become conscious to him that serve his purposes or which he may try to make useful through imitation. His own initiative and his social environment therefore determine the amount and character of the data which he gathers.

When the child enters school it is assumed that among the data that have thus been accumulated there is enough to introduce and carry on an entirely different method of getting knowledge. The school selects what it needs without trying to add new data. The reason that cat, dog, cow, etc., have such a prominent place in early primary lessons is not merely that they are simple words, but also because they are associated very intimately with

the experience of the average child. Ax and ox which were honored in the first lessons of the primer of the early days do not have the same significance now and hence have been eliminated, though perhaps unconsciously.

It may be noted here that in the high school, the laboratory exercises furnish the data for understanding the subject. Few science teachers think now of simply using a text book and expecting the undirected experiences of the pupil to suffice for him to understand the subject.

It is not less reasonable to expect the primary teacher to direct the experiences of the child and help him through suggestions and by other means to gather data that will be definitely useful to him in his school career. As a matter of fact the successful primary teacher does do this although she may not be conscious of it.

Applying this idea to nature-study the problem of the primary teacher as concerns this subject is to direct, as far as circumstances will permit, the data-gathering of the pupil.

A concrete example will illustrate what I mean. A few months ago a favorite nature-study topic for the primary grades was the leaf. I find in a certain state manual these questions from a sample nature-study lesson intended for the first grade: "Why does the leaf turn red?" "Why does the leaf fall?" and a number of similar ones. The answers were not given in the manual for obvious reasons. These are hard questions for a botanist to answer, let alone a six year old child. The teacher might get a lot of answers to these questions. The child would be getting experiences, or rather vocal exercises, but surely not experiences with nature. Such a procedure would be questionable even in a language lesson where oral expression is desired, for language presupposes something to say—not guessing.

It is just such lessons as this under the guise of nature-study that are doing more harm than good. Here all that we may reasonably expect of a first-grade child is that he become conscious of the fact that many of our trees drop their leaves, and, that associated with this phenomenon is a prominent display of color on some of the most common ones. This is one of the great aspects of nature in the autumn. We may pretty safely assume that the child is already aware of it, for he is delighted with the gorgeous colors and makes use of the leaves in his play

because of the color. Likewise, he enjoys piling up the fallen leaves and kicking them about. Further than this he is not much interested. But if the teacher really wishes to add to his data concerning leaves, she may direct his activities in collecting, we will say to a few kinds that are strikingly associated with particular trees, for example, the white ash. The new experience here is that the white ash (at least in the northern states) has purple leaves. The purple is so characteristic that the tree may be identified from a considerable distance. The child likes to collect leaves and often does so without suggestion. In directing his attention to a few particular kinds of trees he gets a good mental picture of these trees in their fall aspect.

Ignorance of the teacher as to the identity of the most common trees may be urged against such a plan. But she may find out easily, whereas it is impossible for her to answer the questions above quoted, at least at the level of the children.

Dewey says: "Things hardly come within his (the child's) experience unless they touch, intimately and obviously, his own well being, or that of his family or friends."[2] This suggests that the data which the child collects is to be found in his immediate environment, or in other words the common things which may have a part in his activities It also suggests the method of handling the material. The ordinary recitation method—that of question and answer—limits the activities of the pupil to oral expression. Whatever interest is shown is really due to the limited opportunities for self-activity afforded by participating in the recitation, and not to the subject under consideration. For example, an October lesson on the "red or yellow woolly bear" involving questions and answers concerning such details as color, covering, number of legs, kind of food, etc., would no doubt bring a lively response from the child. But here the insect furnishes the occasion for about all the self activity allowed in the schoolroom. To be sure, some impression may be made, and the child may be sufficiently interested to learn of his own accord something first hand about the animal. The teacher's aim here is concerned chiefly with the recitation. Suppose instead of this formal recitation the attention of the child is brought to the

[2] John Dewey, "The Child and the Curriculum." University of Chicago Contributions to Education, No. 5, pp. 8–9.

"woolly bear" not for the purpose of having him tell what he knows but to learn more by means of his own efforts. The first thing that she is to be sure of is that the child really knows the "woolly bear" when he sees it. Simple directions are then given as to how to find the caterpillars as they are crawling around seeking a place to transform into pupae for hibernation; how to capture and keep them in small paper boxes; and how to watch them from time to time. By some such procedure the child will be able to see the caterpillar transformed into a pupa within a felt-like cocoon. If the child has discovered all this through his own efforts, he has learned one of the great facts about this insect, and insects in general. If in the spring the cocoons are placed in glass jars or bottles in a warm sunny room, another great fact will be learned: The transformation into a moth. The mental image of the restless, crawling caterpillar, the cocoon of hairs and silk is made vivid again in this new association. The story of the caterpillar getting ready for winter may then be told by the child, for it has been made clear by real experience.

If in the spring silkworms are reared by the pupil and followed through their entire life-history, the experience with the "wooly bear" has a new significance. Suppose that similar experiences with other insects are obtained during the next three or four years. The child thus equipped with data is ready in one of the grammar grades to take up special problems concerning some of our common injurious insects, e. g., the codling moth. But such problems will involve the use of other nature data such as birds, for birds are useful in destroying insects. Reading will have an immediate practical use as a tool to handle bulletins and other accounts of the material investigated.

Nature work of this character thus unifying the previous experiences which were interesting in themselves gives the child some training as an investigator. He is naturally at the grammar-school age an investigator, but gets little help or encouragement from the schools.

Such studies not only stimulate in the pupil wholesome interests outside of school hours but give him the right attitude toward the subject. He will be less inclined to be superficial, and less apt to feel that he knows all about a thing because he has read about it in books or has been told of it in school. He will also be keen for science when he gets into high school. Here

science may help him to a further interpretation of his experiences.

I have tried to indicate that the basis for organizing nature-study in the primary grades may be reduced to simple data-gathering, and to show also the relation that such work bears to the subject in later grades.

At first glance such a proposition may seem too indefinite, and lacking in unity. Dewey has answered this objection, at least in part: "He (the child) passes quickly and readily from one topic to another, as from one spot to another, but is not conscious of transition or break. There is no conscious isolation, hardly conscious distinction. The things that occupy him are held together by the unity of personal and social interests which his life carries along. Whatever is uppermost in his mind constitutes to him, for the time being, the whole universe."[2]

Each experience if it is made real by self activity and participation is an unit in itself. If this experience is secured we need not be concerned about unity, for when various experiences are brought to bear on special problems in later years they become unified through new associations.

Since the material for nature-study is almost unlimited, some selection must be made. Certain things are more important than others. The child is ready to be directed within certain limits. Therefore it matters not so much *what* material is used as *how* it is used.

I would suggest the following considerations in the selection of material: (a) some vital human interest; (b) a content which is worth while; (c) a sequence from grade to grade and from year to year.

It is obvious that the natural and industrial environment of the school should furnish the material. On these the child has already drawn for his experiences. But environments differ, and likewise the industries of the people. No course of nature-study may be planned that will exactly suit any two places. Each school presents a separate problem. It should be the business of the primary teachers of each school to get together, take stock of what is being done, and determine what is to be considered in each grade. Suppose, by way of illustration, that

[2] loc. cit.

twelve common birds are regarded as a reasonable number for children to know by the time they have completed the third grade. Four of the most common ones may be taken up in the first grade, and four in each of the succeeding grades. In each of the groups of four, at least one winter resident should be included, so that the children may have a special interest in seeing that it obtains food during severe weather.

One exception to having the immediate environment furnish all the material for nature-study is the case of the larger mammals. These are of great interest to children. Whether this interest is due to folk-stories, or the circus with its posters scattered everywhere, or something else, the fact remains that it is very real. Perhaps the best evidence of the child's fondness for these animals is found in the juvenile department of the bookstore where there is always a demand for books containing pictures and simple accounts of the lion, tiger, bear, elephant, etc. Such subjects must be studied mainly by means of pictures and stories. In using them two things are desirable: (a) that the child should get a clear visual image of the animal; (b) that he should also have as definite an idea as possible of the animal in its natural environment, for without this the animal's characteristics will have no meaning. The picture will give the image, and the story will animate the picture.

If an acquaintance with a number of animals is thus made in the primary grades, the pupils will be well prepared for such studies as suggested by Downing[2] where the cat and dog are compared with their wild relatives; or to make the most of visits to zoological gardens by following directions for observation like those prepared by Guyer[3] for the Cincinnati schools.

It is not possible within the limits of this paper to go further into the details of selection of material except to add that a wide range of subjects should be included: Domestic animals; common local wild animals; animals of the circus; ten to fifteen common birds; life-histories of several common insects—at least one each year; seed and their distribution; seasonal aspect of several trees; development of seedlings from seed; a few common

[2]Elliot R. Downing, "Methods in Nature-Study," this journal, vol. 3, p. 225.

[3]Michael F. Guyer, "How to Study the Animals at the Zoological Garden." Published by the Cincinnati Zoological Garden.

spring flowers; life-history of the toad and frog; a few examples from pond-life; the most important field and garden products of the region, including cultivated flowers; physical phenomena (weather, erosion, etc.). From such a range of subjects it ought not to be difficult to select a series having a sequence from grade to grade. When such a series of nature-subjects has been planned for the primary grades it should be understood as merely tentative—a beginning of organized effort. A year's experience and acquaintance will furnish a basis for reorganization and better results.

There is one serious difficulty connected with such a procedure in our smaller school systems, viz., the shifting of teachers. If the same teachers remain for several consecutive years it is a simple problem to adjust the work. But if a group of primary teachers (or one primary teacher in the small graded school) attempts to plan the work as I have indicated, not much will come of it unless some provision is made for the future which will take into consideration the probabilities of new teachers. Some sort of a record, therefore, should be kept showing just what subjects are taken, and such other details as to source of material, dates, etc., as may seem important. A record of this kind is valuable whether the teacher remains or not.

What I have said in regard to the importance of records of nature-studies is equally important in its application to other phases of school work. I can think of no other great work where business is carried from one year to another, often in new hands, in such an unbusinesslike way as is the common practice among schools. All the new teacher has for guidance is the meagre information in the register containing merely the names, ages, attendance and stages of advancement of the pupils. No commercial business could possibly attain much success with such methods.

SOME FUNDAMENTAL NEEDS IN NATURE-STUDY

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It is not the writer's intention to dwell upon the value of nature-study in educating children but rather to inquire into a few phases of the nature-study situation as it now exists, at least in some parts of the middle states, and to point out what to him seem to be some of its urgent needs.

As we all know, the idea has had powerful and brilliant advocates for hundreds of years, ever since the time of Comenius and probably long before. We have had such precepts as Bacon's "We should accustom ourselves to things themselves" and Agassiz's "Study nature—not books," dinned into us year after year. But notwithstanding all this, the old memory grind goes on in the school. Why? Why is it that much of the work in nature-study cannot be reckoned successful today and in not a few instances falls little short of farcical?

It is evident that any movement towards improvement of existing conditions must be based upon an analysis of the causes of the present shortcomings of the subject. While there are a number of important contributory factors, the fundamental one, it seems to me, we must admit is the poorly prepared teacher. And this may be said without casting any reflection upon our present-day teachers, because the subject has come into favor since they had their pedagogical training. As a rule where nature-study is required, it has been put into the curriculum by some one in authority and then each teacher has been notified to teach it. The prevailing idea seems to have been that any one can teach nature-study and so the work has been saddled onto teachers who have had no training in the subject-matter, who are not imbued with the spirit of the movement, and who, in consequence, have but vague ideas of what the subject is intended to do for the child. Their own training has frequently been of the formal type, based upon memorized ideas instead of personal experiences, and the result is that they become bewildered when called upon to teach something that cannot be prepared for directly from books. These facts together with the tremendous pressure under which the modern teacher works are far from be-

ing conducive to the development of an educational point of view which is new to them.

Indeed, it is very questionable if our present attempts to make over our whole body of existing teachers into teachers of nature-study will meet with any great measure of success. For it means a recasting of the whole mental being on their part; a breaking of old and the establishment of new habits of thought. We are certainly over sanguine if we expect to jostle them out of their bookish ways in any considerable numbers, and lead them to the proper point of view for the teaching of nature-study, while they are still occupied day by day with the numerous cares of the schoolroom. Fortunately, there is a certain proportion who have always had some bent toward nature-work, independently of the school, and it is chiefly to these we must look until adequately trained recruits are forthcoming from our normal schools and colleges.

However, granted that the teacher is able and willing to undertake the work, it will be found that many teachers have had difficulty in finding out just what nature-study is. Nor are their hazy ideas in this respect to be wondered at when one considers the confusion that has reigned to within the past two years, even among the professional advocates of the subject. One needs only to read the symposium on nature-study in the earlier numbers of THE NATURE-STUDY REVIEW to agree to this. According to the training and predilections of the respective contributors, now one, now another conception has been advocated as approximating most nearly to the ideal course in nature-study.

It would appear that at least two distinct ideas are masquerading under the name of nature-study. The first verges on the sentimental. Its aim is to awaken in the child the proper emotional attitude toward nature. It has in mind more the child's feelings and sympathies. The other idea regards more the child's intellect, the necessity of training him to observe accurately and to think clearly.

During the past two or three years it has become evident, I think, that both ideas have their value; but it has also certainly become manifest, as far as the writer's observation has gone, that there is great danger of overdoing the sentimental side and that the "thrillers" are not the best teachers of nature-study nor the ones who best know nature.

While we want the child not only to observe and reason about natural things but to enjoy nature as well, the fact remains that just in proportion as his powers of observation and reason have been trained on the material of nature, will he be able to approach that personal appreciation which, with its accompanying influences, all admit is the final purpose of the nature work. Somewhere Goethe has said "Man sieht nur was man weiss," and certainly this is nowhere truer than in appreciation of the beautiful in nature. Once we have examined an object or phenomenon, our attention and interest is more quickly attracted a second time, and with the constant reappearance of kindred phenomena we are stimulated to seek out relationships, and we thus grow in appreciation of the fitness and beauty of nature. No amount of ecstacy on the part of the teacher will arouse this in the child. As his knowledge of the facts of nature broaden, nature must make its own appeal. I believe I am safe in saying that to one who is training teachers of nature-study this very question of sentiment towards nature is the most unmanageable one that confronts him. If any favorable recommendations are made at all, the chances are that by the time the matter filters down to the young child it has dwindled into the veriest twaddle.

Sentiment is of so ethereal a nature and appeals to different persons in such diverse forms and degrees that it is a hazardous undertaking to try to engraft ones own variety upon another personality. While the great painter or literary artist may accomplish this with some degree of success, it seems saner to recommend to the teacher of nature-study to attempt it but sparingly. Certainly the personality of the young child is far from being ready for the sentiments of the adult. The appreciative attitude toward nature which radiates unconsciously from the intelligent lover of natural beauty is usually of far greater value in its effects upon his childish associates than any amount of conscious inculcation of sentiment can be. A teacher full of the spirit that emanates from such works as Lubbock's "Beauties of Nature," Van Dyke's "Nature for its own Sake," or the writings of Thoreau, Ruskin, Burroughs and Gilbert White, will unconsciously imbue his pupils with the proper attitude toward nature in the full measure of their respective capacities. It is a safe rule to say, first know the thing. After that there is ample time to see how this same or similar things have affected the sentiments of our best writers of prose and poetry.

But the question arises, if our present teachers are poorly trained for nature-work, wherein lies the fault. Teachers in elementary and secondary schools naturally look to normal schools, to colleges, and to universities for adequate training, but it must be confessed that not infrequently they have looked in vain. There can be little doubt that some of our normal schools merit the charge sometimes brought against them of stocking their students with a plethora of method without giving them an adequate foundation in subject-matter. On the other hand, there is equal justice in the claim that many of our universities and colleges are ignorant of the needs of teachers in the lower schools or are not interested in them. Seemingly many university professors have no conception of the nature of the work which will be required of the majority of their hearers who go into the profession of teaching, or for that matter into any other profession where initiative and creative effort are at a premium. While our ideals of what true university work should be, may be cited in justification of present university methods of instruction, still the practical fact confronts us that here in America, besides affording opportunity for research and supplying information for such purposes, most of our universities must likewise perform the functions of a college in supplying the more disciplinary work of teaching their students how to think and how to approach truth. And it is from a lack of this very disciplinary work that our nature-study teachers of today are suffering. They have been fed largely by the funnel method. They have sat at the feet of their scientific or literary Gamaliel instead of rolling up their sleeves and bending to the work with him—a fact for which he is responsible rather than they. Their shortcomings as teachers are due not infrequently to his failure to realize that, in the foundations of his subject at least, his own efficiency as an educator is measured not by how much he imparts but by how much he reveals, and that if his hearers are to become successful teachers his own methods must be exemplary. Instead of this, we have predominantly the learned lecture.

The reason for this is perhaps not far to seek. Many of our professors received their advanced training in German universities where the lecture system prevails, and they have attempted to follow out the same plans in our American schools without duly considering the fact that the American student upon enter-

ing the university is much more immature and undisciplined mentally than the beginning university student of Germany who, in fact, has had his formal disciplinary work largely completed in the gymnasium.

As applied in nature-work in this country, the deplorable effects of the lecture system are seen in the great prevalence of the telling of facts and the reading of stories to children by teachers who have the mistaken idea that they are thus teaching nature-study. Whereas, the keynote to the nature-work is not primarily what facts are learned but *how* they are learned. A certain amount of fact-telling is, of course, necessary, and we may admit that the story if used judiciously may be made a valuable adjunct to the work. It is valuable, though, chiefly in so far as it stimulates the child to independent inquiry, and thus while it may become an excellent appetizer, the teacher certainly should not mistake the condiment for the substantial part of the dinner.

Another unfortunate tendency manifested in some of our universities is the putting of inexperienced men in charge of beginning courses. They are cheaper! Thus the most vital work of all, work that should command the careful attention of a skillful teacher, is turned over to the neophyte. When this experimenter has begun to learn something about how to teach and incidentally requires more salary, he is replaced by another recruit, doubtless of unquestionable ability as a student, but crude and unshaped as a teacher. It is little wonder that the products of such tutelage when graduated perpetrate frequent pedagogical enormities on children. Happily, there seems, at present, to be a movement on the part of some institutions to remedy this very serious fault.

While the success of nature-work must ultimately rest on the merits of the teacher, there are a number of accessory factors which are scarcely of less importance in determining the status of this work in our common schools. To the writer, the nature-study situation appears to be just at a crisis, at least in city schools, and the near future will reveal whether it is to be continued as a valuable addition to the course of study or to be rejected as one more fad that has had its day. Those of us who have given thoughtful attention to the content and purpose of the subject are ready to proclaim its values, but it can scarcely be said that a similar unanimity of opinion exists among public-

school educators who are daily facing the facts instead of the theories of the schoolroom. Certainly if the subject is to make good on any considerable percentage of the glowing prospects held out by its propagandists, its advocates must bestir themselves into proposing and agreeing upon some rational plan of organized subject-matter. It may really be questioned if the highly idealized schemes of some of its more enthusiastic advocates have not hindered rather than helped the cause in the eyes of some of our practical school principals. However this may be, we are now at a point where propaganda is no longer sufficient. There is urgent need of suitable organization of material and ideas.

Again, I find that the concurrent opinion of the several professors of nature-study subjects with whom I have been able to confer recently, is that too much has been attempted in nature-study. All agree that it is better to restrict the work, at least, until it is more thoroughly established. As a matter of fact this restriction is going on unconsciously, and plants and animals have come to make up the chief material in many schools. The older idea of a helter skelter type of work has been found too Utopian for realization, if for no other reason, because of human limitations. A sufficient number of teachers does not exist who can handle any and all kinds of material that may come to hand, a fact, however, which doubtless works out for the best because while it is true that the child is largely systemless in his observations, one of the prime objects of education is to teach him to systematize things. Where a catch-as-catch-can variety of nature-study has been attempted, the usual result has been that if the children were at all interested, the teacher has been deluged with a mass of material as unfamiliar to her as to them, and with their enthusiasm thus nipped in the bud the children have lost all interest in the work.

Again, from a survey of the general school situation as it exists at present, I believe that if nature-study is to meet with any immediate success in our schools with their inelastic curricula, it must have a being of its own apart from other subjects. This is not true because nature can be made to order but because our school curricula have been so made, and, on account of the inertia of routine, will continue to exist in that way for a number of years to come. In my opinion, one important reason that the subject

languishes now in many schools is largely because it has no backbone of its own, no proper *raison d'être* in the eyes of the teacher.

This does not mean, of course, that the work commonly called nature-study which is used for furthering the child's knowledge of geography, for example, should be abandoned. Such work might well be incorporated in the regular geographical work as a more rational way of teaching geography and not be reckoned as a part of the specific work in nature-study.

The advantages in having a thoroughly systematized line of nature-work with carefully selected materials properly apportioned to the various grades are evident. If the work is planned with the aim of having gradually developed certain fundamental principles by the time the course has been concluded, certainly the child, although unconscious of the fact, has been grounded in proper habits of thought that no amount of desultory observation could have developed. If his investigations have been directed along carefully selected lines he loses none of the joys of discovery which are reckoned so highly by the advocates of nature-study, and yet in the end he will get a cumulative effect of evidence which will be of the greatest value to him. Furthermore, by properly restricting the work, he will have time to grasp something of the significance of a given field, since he is not confused by a mass of totally unrelated phenomena. Moreover, the busy teacher will be benefited in that she has to become familiar with a more limited field and make preparations for handling or supplying a less varied range of material.

As an example of some of the difficulties with which the teachers of city schools are struggling, the replies enumerated below are interesting. They are arranged in order of their frequency and are responses of a large number of city public-school teachers to an inquiry by the writer as to what their main difficulties in teaching nature-study are and why in their opinion it is not more successful.

1. Want of proper material and apparatus; the difficulty of getting material. 2. Taking care of material. Most teachers do not know how to care for material. 3. Lack of specific directions concerning the work for each grade and insufficiency of detail as to what to teach under each subject. 4. How to manage a class of forty or fifty so as to have all of the children, (a) study the various materials individually and, (b) observe objects in

their natural environment. 5. The avoidance of material in the upper grades which has been worn threadbare in the lower grades. For example, children have been "caterpillared" to death, as one teacher puts it. 6. A definite time for the work apart from geography. 7. Principals are not in sympathy with the work. 8. Parents object.

The replies require little comment. The teachers plainly need further instruction in both subject-matter and method. There is a clear demand for a systematized course of study with definite allotments to each grade. The committee of the school-board in charge of buildings needs to be awakened to the fact that the best work can not be done unless proper provisions are made for taking care of material, as for instance, keeping it from freezing over Saturday and Sunday. Finally, judging from replies seven and eight, it would seem that some further propaganda is necessary.

The writer believes that it would be feasible to have in each building some teacher, who has shown special aptitude for nature-study, to act as a supervisor of the nature-work of the entire school. He could confer with each teacher about specific materials, methods and apparatus, see that duplications in the grades were avoided, and act as a general advisor for teachers who were less well prepared. Some such plan, it would seem, is at least well worth trying.

By way of summary it may be said that, as far as the writer can see, the nature-study movement is at a critical point in its development. There is a pressing need for teachers who are in sympathy with the work and who have been adequately trained for it. We can look upon the present attempts to make over mature, conventionally trained teachers into teachers of nature-study as at best but a temporary makeshift to tide us over until the work can be put into the hands of the recruits from our higher schools, and these new teachers will be successful largely in proportion as they themselves have been *doers* rather than *hearers*. The responsibility for their kind of training rests largely upon their instructors in these higher institutions of learning. There is need of a definitely systematized and graded course of study, as we now have in geography, for example, which at the conclusion of the sixth or eighth grade, as the case may be, will have unfolded before the pupil and made him conscious to some extent of

some of the great principles of unity and order which pervade nature. Manifestly, it is absurd to expect teachers to attain to this desired end unless they themselves have traversed the ground and have a general understanding of these principles.

SOME CAUSES OF DEFECTIVE METHODS IN TEACHING NATURE-STUDY

By FANNIE M. PERKINS
Principal of Glenwood School, Toledo, O.

Nature-study forms a part of our school-curriculum whether it appears under that title or one more or less formal. That our present system of presentation is defective is a fact so evident as to need no proving. To find the cause or causes for these defects is necessary, since causes must be known before difficulties can be overcome and a failure in efficiency is far less dangerous to us as teachers than a failure to frankly acknowledge and bravely face facts.

We may perhaps glean some comfort from Professor John M. Coulter's statement that "Perfect adaptation means stagnation," and rejoice that our work is not stagnant since it falls so far short of adaptation to the recognized needs of modern life.

That we are not teaching children to look upon life with "seeing eyes" is one root of the evil, though it may be possible, by digging deeper, to discover that we ourselves were not taught to see, intelligently, this "great wide wonderful world" or even a very small part of it. We *look* but we do not see. We hear, but seldom listen. Life moves in panoramic pictures before our eyes, and, beyond a passing thought, the beauty and infinite wonder of it all is not realized. The Japanese conception of the spirit of life, abounding in flower, tree, rippling stream, bird and bee would seem much more refining and civilizing in its influence than is our appalling twentieth-century indifference, more dangerous by far than ignorance.

Another cause for defective nature work may be found in the fact that we seem to be living in a "taking things for granted age." Miracles of science have become so common as to pass almost unnoticed. Miracles of nature are plainly sharing the same fate. In our efforts to remove all possible obstacles from the road to knowledge, we seem to have allowed the pendulum to swing too far. Our children are becoming so blasé that it really seems as if nothing astonishes them. If in place of the almost perfect modern school-building, a palace of marble could spring up in a single night, children would walk in through bronze doors, up

stairways of onyx, seat themselves on chairs of gold and go to work at diamond-studded desks in a perfectly serene, matter-of-fact manner. The spontaneous joy of discovery evidenced by the kindergarten child has given place to a tolerant acceptance of "things as they are." This picture may be a trifle overdrawn, but it is not a pessimistic view at all. The older child is quite as lovable, though spoiled by our over-indulgence, and all of this may perhaps be more truly called an effect of our work than a cause of our failures. In this case the fault must be wholly ours.

We can truly say that the real teachers have always led children back to "Nature, the kind old nurse," though all programs did not show a formal period set aside for nature lessons. A reading lesson has been so skillfully taught that the child "flitted across the lonely beach" and realized in some measure the Providence vast enough to encompass the universe and include "one little sandpiper" and himself. Bryant's "Forest Hymn" has, with wise interpretation, taught the mystery and magnitude of the forest. Many and varied inspiration poems and stories have been means of turning the child mind to the sources of such inspiration. Picture-study deals largely with nature-study. Drawing teachers call special attention, not only to drawing from nature directly, but also to the conventionalized forms of leaf, flower, and seed-pod used in designing. Physical culture drills emphasize by imitation the graceful motions of trees, birds and butterflies. Live teaching in geography creates an interest in the study of atmospheric conditions, soil and rock formations, fauna and flora.

All this being true, why are we not accomplishing anything near the desired result? The answer of the biologist will probably be, "Because you are working in the abstract, while all about you lies a world full of concrete materials." Nature-study implies the *actual observation* and study of common natural objects. The three essentials, upon which all authorities agree, are lacking: (1) direct observational study, (2) *common* things of nature as subjects of study; (3) the standpoint of human interest in nature as it touches our lives directly. You are confusing science lessons with nature lesson, and overlooking entirely the great fundamental "education of unification," so well understood and taught by Froebel. By a logical sequence the child in the kindergarten is taught many and wonderful

things. He learns that in the tiny seed and inert chrysalis are concealed life forces which under favorable conditions will expand into plant and butterfly. He learns, *by seeing*, the home-making instincts of bird and insect and the mother-care of nature for her children. He is taken out-of-doors and his attention is directed to a few of the concrete phases of nature and a sympathetic interest is easily aroused. This is done without formality but *with system*, and there can be no excuse offered for failing to continue the work so well begun in the kindergarten, to keep up the love and study of nature *from nature* and from that inexhaustible source lead to the love of art, science and religion. Continue also the walks and excursions so valued by Froebel. Try to see not *how much* but *how well*. Select materials fitted to the growing interests of the child. Win him to an appreciative knowledge of how "Spacious and fair is the world," and artificial vulgarisms will not attract him. By thus using the "all-quickening creative power of child-life" we should be able to overcome some of the glaring defects in our present well-intentioned but desultory system and at the same time solve some of the sociological problems of the day. It is surely time we realized that "To know nature and man is the sum of all earthly knowledge."

NATURE-STUDY WORK AT THE OHIO STATE UNIVERSITY

By HERBERT OSBORN
Ohio State University, Columbus, Ohio

In response to the request for information concerning the work done the State University in the line of nature-study, I am pleased to give some details; but perhaps should preface these by the statement that while a small amount of work is included under this particular head there is a large amount of work done in the Departments of Geology, Botany and Zoology which is directly available as training for teachers who are engaged in nature-study teaching. A course in nature-study is offered in the College of Agriculture which includes a general treatment of the subject embracing the different points of view, these being open to election by the various students who may have the teaching of elementary agriculture or nature-study in view. There is also a department of extension work in which a large amount of time is devoted to institute work and assistance of country teachers in the direction of the best methods of teaching nature-study in the common schools. This work in charge of Professor Graham and a competent assistant who give their entire time to the subject, is supplemented by the publication of the Extension Bulletin devoted to illustrations and guidance in this direction.

In the Department of Geology the courses in physiography are offered and embrace much that is of fundamental importance in the matter of laying a foundation for a full understanding of the ecologic relations in the different kinds of animals and plants.

The Botanical Department offers courses which are of special value to teachers, and provides a summer course at the University especially intended for teachers, and during the winter months provides for a tropical course under the direction of Professor Kellerman. For this course a number of students travel with Professor Kellerman in Central America and have excellent opportunities for the outdoor study of tropical life in native conditions.

The Department of Zoology provides general courses and a course especially designed for teachers which aims to emphasize particularly the ecologic features of zoology with a view to furnishing the best foundation for thorough nature-study work.

The University maintains also the Lake Laboratory located at Cedar Point near Sandusky, offering summer courses which are attended by an increasing number of students and teachers from the schools and colleges of Ohio and adjacent territory. This laboratory has a very favorable location looking from the front directly out upon Lake Erie and one of the finest beaches of the lake region, while within a few steps at the rear is a quiet cove opening into Sandusky Bay with extensive stretches of open water and swamp. On one hand is a considerable area of native forest, while in the other direction is a series of sand dunes, and altogether the locality furnishes an opportunity to study plant and animal life under a very great variety of conditions. The courses offered here, are given with special emphasis upon the ecologic side, in fact many of the lectures as well as the regular field work being given out of doors with the immediate environment of the plants and animals under discussion directly at hand. The courses involving especially this out-of-door treatment are devoted to plants, birds, insects, fishes and aquatic life in general. The laboratory has been fortunate in securing the assistance of a number of the best known teachers in special subjects, and among the names that have been upon the instruction staff are those of Professors W. A. Kellerman, W. E. Kellicot, M. F. Guyer, L. B. Walton, E. L .Rice, F. L. Landacre, W. B. Herms, M. E. Stickney, Lynds Jones, and Chas. Brookover.

ORGANIZING A FIELD TRIP

By H. M. BENEDICT
The University of Cincinnati

Field trips are considered to be of the utmost importance by the teachers of nature-study and—are seldom made. The idea of an excursion to the woods or fields is most alluring at first thought. One sees in fancy the eager children searching out the secrets of nature and can picture the new enthusiasm with which they will be inspired.

And yet, perhaps, the field trip when it actually occurs turns out to be a wild scramble of excited children in which few of nature's secrets seem in any danger of capture, while the return resolves itself into a retreat led by a hoarse and discouraged teacher.

The reason why the field excursion is so often unsatisfactory is that insufficient preparation is made for it. The plain fact of the matter is that a field trip requires more careful preparation on the part of the students than any recitation or laboratory period. Not only this, but if the class is a large one there must be a special organization effected. If the proper preliminary work is done the field excursion is an inspiration to the students and a pleasure to the teacher.

Probably the best way to explain the methods which have proved valuable in the writer's experience will be to describe the preparation made for a specific trip. For example the manner of organizing an excursion to a pond may be taken.

Field Excursion to Jones Pond

1. The teacher must make a preliminary scouting trip to the pond in order to become familiar with the surroundings, as well as for the special purpose of determining what plants and animals are present in sufficient numbers to serve as practical objects for study.

2. A plan of the forms to be studied and the points about each to be considered must then be carefully, very carefully, made.

3. This plan must be reduced to an outline as concise as possible and the following outline must be read to the children and written on the blackboard, at least one week before the excursion is to occur.

We shall start at 2 o'clock, one week from today. Each one is to take along a mason fruit-jar with its cover.

Our object is to find out what animals live there and how they get their food and escape their enemies. Each one must find out these things for himself; do not ask anyone else to tell you nor answer any questions. Each must be a true investigator.

Plants and Animals Living in Jones Pond

A. *Animals that jump into the water when frightened.*

Walk up to the bank of the pond very slowly and carefully in order to get a close look at the frogs as they jump in.

Frog.

How it escapes enemies.

1. Does it jump in head first or feet first? Is this way quicker than the other would be?
2. Can you see the frog after it touches the bottom when this is mud or clay? What does the frog do when he strikes the bottom that hides him from his enemies' eyes?
3. Watch very quietly to see where the frog comes up to breathe. How long did he stay under? Time another frog.
4. Does he come up at the same place at which he went in? Do you think there is any advantage in this habit?
5. Does he come up where the water is clear or where there are plants growing or floating? Does he act as if he were trying to hide and yet keep his eyes on you?
6. Can you see the two little holes he breathes through on top of his nose? Are these breathing holes so placed on his head that he can get air without lifting his head out of the water? What is the advantage in this?
7. How are his eyes placed? What power does this give him that will help him to escape from his enemies?
8. Can the frog go backward into the water when frightened or must he first turn around and then dive?
9. Catch a frog if you can and find out whether his skin is slippery? Is it hard to hold him? Why?
10. What peculiarity of his hind feet helps him greatly in swimming? Is the same structure found in his front feet?

How it captures food.

1. Very quietly watch a frog resting on the shore or on some floating object to see if you can find how he catches flies or other insects. You will have to be very quiet and patient.
2. Tie a little rag of red flannel to the end of a string on a pole and dangle it in front of a frog slowly, being careful not to frighten him. If he is not frightened he will show you how he tries to capture food.
3. If you can find a frog in the grass you will probably see him catching insects. A toad catches them the same way, and if you find one watch it.

4. Put a living frog in your mason-jar to take back with you. When you reach home put flies in with the frog and then you can plainly discover how it gets its prey.

B. Animals that run on the water.

Examine the surface of the pond to see whether there are any insects present that stand on and run over the water on long legs.

Water-striders.

1. How do they get away from you?
2. Can they see you? Do they have eyes?
3. How many legs do they run on?
4. They catch and hold smaller insects and suck their blood. Can you see one do this?

C. Animals swimming in the water.

1. Can you see any fish? How do they capture insects and worms?
2. Are there any "whirligig beetles" swimming in circles on the surface of the water?
3. Does their body rest on the water or do they stand on their legs as did the water-striders?
4. Catch one and note the odor. Do you understand why they are not bothered much by enemies?

D. Animals that crawl on submerged leaves.

Lift leaves and water plants out of the water and examine them carefully for small animals. Find the following kinds:

1. Water-Armadillos—flattish, segmented animals with feelers and hard bodies.
2. Snails—have a coiled horny shell. Can they pull their bodies entirely within this shell when frightened?
3. Water-Fleas—these are very small active animals with jointed legs. In order to see them plainly you must place a number of leaves and water plants in your mason-jar and fill it two-thirds full of water scooped from the pond. Screw the lid on tightly. Look through the glass after the water has begun to clear, holding the jar as steady as possible, and see how many kinds of water-fleas are swimming around in it. Find at least two kinds—
   1. One with an arched back which swims so fast that it seems to dart, and which often swims upside down—fresh-water shrimp.
   2. One that looks a little like a very minute three-leaf-clover, which moves by little jerks—this is the female Cyclops so called because it has but one eye. The two oval parts on each side of the longer central part are clusters of eggs which the mother Cyclops carries with her for safe keeping.

   Take the mason-jar back to the schoolroom or your home as these little animals will live for months and you can watch them at their daily work. If you keep the tops screwed on you will not need to add water to the jar for several weeks.

E. Plants floating in the water.

Most plants are fastened to the ground by roots but you must find in the pond two kinds that are not.

1. One kind looks like a very minute leaf flat on the water with delicate white roots hanging down—called duckweed.
2. The other kind of plant looks like a tangle of green threads floating in the water and such plants are called Algae. Do the Algae have any roots?

Put some of each kind of plant in your mason-jar.

Much of the above outline could be given in the form of verbal explanation of the outline, but it seemed well to indicate rather fully the details necessary for the student to know.

4. The list of the animals to be studied and the facts about each to be discovered must be memorized by each student. A sufficient number of rehearsals of these points should be required of the class to make sure that each child when he reaches the pond will know exactly what he has to do and in what order it is to be done. He must have all of the questions in his head in order that he may turn directly to nature for the answers, independent of teacher and fellows. The mental attitude of a boy thus prepared is radically different from that of one who in obedience to vocal directions "sees this and sees that." The importance of this preliminary knowledge on the part of the student cannot be overestimated. A field trip properly conducted will make an impression which will last for a life-time and there should be no slipshod methods.

5. Each student must know that he is to be held responsible for the working out of each detail of the outline and that he must do it without help. A careful test should be given the class as soon after the excursion as possible. Give the child the knowledge of what he must do and then hold him individually responsible for doing it and success follows inevitably.

6. If the class is very large, divide it into sections, let each section elect a leader, and assign to each the direction from which it shall approach the pond.

Any one desiring to conduct an excursion to ponds or streams will find the following books helpful in identifying common water forms: "*Aquatic Microscopy for Beginners*," by Stokes; "*Insect Life*," by Comstock; "*Fresh-Water Aquaria*," by Bateman; "*Natural History of Aquatic Insects*," by Miall (best).

The general nature-study trips in which the attention of the children is called to everything in the heavens above, the earth

beneath and the water under the earth are impractical because the field covered is so great that there can be no proper preparation, no sense of responsibility and therefore very little real individual observation. Our pupils must discover some of the secrets from nature herself before they will begin to love or even appreciate nature.

The only seed from which a love of nature can grow is a fact personally discovered by the child. We may radiate the sunlight of enthusiasm and pour the showers of loving appreciation but there can be no growth until that seed is planted.

OHIO NOTES

At Ohio University, Athens, Ohio, nature-study is given during the spring and summer terms. The course includes field study of birds, insects, flowers and trees.

Ashland College, Ashland, Ohio, gives a course in nature-study four times each week for eight weeks consisting largely of field work and notes on the same.

The Cincinnati Society of Natural History has recently prepared a number of portable cases of birds, insects and woods which are to be passed around from school to school as supplementary material for the nature-work.

The nature-study work of the University of Wooster, Wooster, Ohio, occupies five periods a week for one term. Field work and the note-book form prominent features.

During the year 1906, The Home Gardening Association of Cleveland, Ohio, distributed 435,038 packets of seeds, 244,199 packets of which went to the children of Cleveland schools and 190,839 to schools and organizations outside of Cleveland. During the same period 101,000 bulbs were distributed. The report for 1907 is not at hand.

The University of Cincinnati offers two courses for teachers of nature-study, one in plant life and the other in animal life. The courses are given in alternate years and continue throughout both semesters. Each week one hour is given up to discussions or lectures and three hours to laboratory or field work.

Cleveland, Ohio, in 1901 had one "test" garden in the center of the city. By 1906 eight school gardens had been established.

Miami University, Oxford, Ohio, gives fall and spring courses in nature-study, the materials for which are selected with special reference to their availability and utility for instruction in elementary schools.

A number of educational institutions in Ohio give courses in elementary agriculture which are also proving of great value to teachers of nature-study. The same is true of several institutions giving special courses in ornithology.

Professor B. M. Davis has issued recently a very practical, illustrated pamphlet on "The Soil and Its Relation to Plants." (The Miami Bulletin, No. 3, May 1907. Oxford, Ohio). The purpose of the bulletin is set forth in the author's own words as follows:

"The exercises outlined in this bulletin represent work that has actually been done by pupils of the sixth to eighth grades. Part of the work was done by pupils of the County Model School No. 1, Ohio State Normal College, an ungraded district school enrolling about twenty five pupils, in Oxford Tp., Butler Co., Ohio."

"The bulletin is intended to encourage and assist teachers who wish to introduce elementary agriculture into their schools and do not know just how to begin or how to conduct the instruction."

"The subject of the soil and its relation to plants is taken up partly on account of its fundamental importance in farm practice, and partly because it represents fewer difficulties in the way of experimental study to be carried on by pupils of the grades or of the first year of high school. Furthermore, it is one of the few phases of the subject of agriculture that may be studied to advantage during the winter. Indeed, experience has shown that such work as suggested in the following exercises offers a practical solution for the problem of school management during bad weather."

The editor of this number of THE REVIEW has taken the liberty of publishing the following excerpts from a letter written to him by a prominent educator who, perhaps, as much as any one else in the State has had the opportunity of coming into contact with the nature-work of the rural schools of Ohio: "As to notes concerning nature-study in the country schools, I know very little. Judging from my experience with teachers during the past summer I think there is very little if anything done. Some attention is given in many townships to agriculture in the higher grades. * * * In the small cities such as Bellevue, Fremont and Van Wert some attention is given to nature-study. The superintendents are in sympathy with the work and urge their teachers to take courses in nature-study in summer schools. Over forty of such students were in my classes last summer. On the whole, judging from my short residence in the state, I should say that the nature-study idea has not reached the country schools nor even the village schools; and that it will come to them under the name of agriculture. They will hardly recognize it under the guise of nature-study. The use of Hodge's "Nature-Study and Life" a few years ago may have made some impression here and there. I find also that nature-study is a rather popular institute subject. But my experience was that those who were interested were mostly city teachers. * * * These are merely my impressions. I shall know more about it in another year."

AMERICAN NATURE-STUDY SOCIETY

As a result of a recent communication by mail with all members of the A. N.-S. S., the secretary is authorized to announce that the second annual meeting of the Society will be held in Baltimore next December in connection with the meeting of the American Association for the Advancement of Science and other scientific societies; and also to announce that a conference of the Society will be held in Cleveland, Ohio, on July the 3d at 2:30

P.M. The National Education Association will begin its meetings on Monday, June the 29th and will close on July the 3d. It has seemed advisable to place the Nature-Study Society meeting at the close of the N. E. A. meetings because most members of the Nature-Study Society will wish to take part in the N. E. A meetings, especially in the Departments of Science and of Rural Education. Since so much material of interest to workers in nature-study will be presented in these Departments of the N. E. A., it has seemed advisable not to attempt a regular meeting of the A. N.-S. S., but rather to call together the members of the Society for a conference on one afternoon only. This conference will have the advantage of bringing the Society into touch with many educators who can not attend the annual meetings of the scientific societies; and at the same time a conference will avoid many of the disadvantages of a more extensive meeting. Also, with the short time for preparation, it would not be possible to prepare for the program which the officers of the A. N.-S. S. are planning for the annual meeting in December.

The topic for discussion at the conference on July the 3d will be the Training of Teachers of Nature-Study and Elementary Science in Normal Schools and Colleges and the discussion will be opened by six or seven short papers, not to exceed fifteen minutes in length, presenting the work done in some of the best schools and colleges. This conference may be regarded as preliminary to a much more extensive discussion and study of the same subject under the direction of a committee appointed by the Council of the A. N.-S. S. to consider and report on the training of teachers of nature-study and elementary science. It is hoped that the committee may make its first preliminary report next December and then carry on the work for a term of years.

Members of the A. N.-S. S. who expect to go to the N. E. A. meeting at Cleveland are requested to inform the secretary of the Society. Those wishing programs of the N. E. A. meetings may obtain them direct form the Secretary of the N. E. A. at Winona, Minnesota, or through the Secretary of the A. N.-S. S.

New York City Section of A. N.-S. S.

A meeting of this section will be held at the American Museum of Natural History on Friday, May 8 at 8:30 P. M. The meeting will be devoted to a survey of the existing conditions which affect the teaching of nature-study (in the broadest sense) in the elementary schools of Greater New York.

NATURE-STUDY AND THE PRESERVATION OF AMERICAN GAME BIRDS

By C. F. HODGE
Clark University, Worcester, Mass.

I feel that I would willingly give $10.00 just to see a flock of wild swan flying over Worcester this spring, a dollar just to see, and hear, a flock of wild geese once more, $10.00 just to know where in Massachusetts I could go off into the woods and get a glimpse of a flock of wild turkeys in their ancient native haunts, and a $20.00 bill just for a glimpse of a flock of wild pigeons straggling across the sky. I can hardly say what I would not give and how far I would not travel just to hear the prairie chickens booming again, as I used to hear them when a boy.

One by one, as the country has been settled to the west, our magnificent game birds have been exterminated. For more than a century all manner of game laws have been tried to stay the destruction and have been found wanting. Why not try public education? What could not twenty million school children and their teachers do, if they determined to reestablish and preserve all American game birds in their native habitats? Our educational system could mould public opinion and nationalize the effort as no other organization in the country could. Is it not legitimate work for the modern nature-study movement?

Not to deal further with the theory, I wish in the present brief note to call attention to a few of the most urgent problems in this field.

Passenger Pigeon—Fifty years ago this pigeon existed in countless millions. Mr. Mershon writes me (Feb. 13, 1908) that he does not believe that this magnificent species is represented by a single living wild specimen on the American Continent. John Burroughs writes me (Feb. 15, 1908) that he is convinced that a considerable flock was seen last April and again last fall in Sullivan County, N. Y., and President Roosevelt saw a small flock at Pine Knot, West Virginia, last May. Might not the schools of the country give us some reliable information through THE NATURE-STUDY REVIEW? What a satisfaction it would be to know that every school child on the Continent is watching the sky a little on his way to school and wishing even against hope that he might see

with his own eyes a flock of wild pigeons. Then if a flock should be found nesting somewhere this spring, how the news would thrill the land with hope. What a relief it would be to feel that wherever they are, the people sense the vital problem of saving a splendid species for the whole Nation and for future time. How glad we should be to feel that the little flock is surrounded by a living wall of absolute protection, formed by people who would be quick to tar and feather any bird-skin fiend or egger or pot hunter who offered to harm a single bird. Then, no matter what the laws of the different States may be, with this sort of unified and nationalized protection we could, if there are any left alive, in ten years time have the species restored, and again transforming the mast which falls from our forests into beautiful and useful life.

After the birds had become fairly abundant again, but hardly before, I should suggest undertaking seriously the artificial propagation of the species. This should be done by beginning with the eggs. All previous attempts of which I can learn have failed of permanent results, probably because they have started with adult netted birds.

If it could be done so carefully as not to frighten the parent birds from their nests, it might be safe to begin picking up the eggs or squabs that fall out of the nests and would otherwise perish and try to rear these by hand or with the help of domestic pigeons. Then when a thoroughly domesticated strain was developed, we should aim to distribute it as widely as possible over this country, and, possibly Europe, so that the present danger of extinction shall not menace the species again.

"A warhoop has been sounded against some of our western Indians for killing game in the mountain region. Now if these red men are guilty of a moral wrong which subjects them to punishment, I would most prayerfully ask in the name of Him who suffers not a sparrow to fall unnoticed, what must be the nature of the crime and the degree of punishment awaiting our white neighbors who have so wantonly butchered and driven from our forests these wild pigeons, the most beautiful flowers of the animal creation of North America." (Chief Pokagon, *The Chautauquan*, Nov. 1895, reprinted in "The Passenger Pigeon," by Mershon, p. 58).

Another problem: The wild turkey—A number of people are interested in reestablishing the wild turkey in New England, where it furnished the Pilgrim Fathers with their first Thanksgiving dinner. I would be willing to do the work of incubating and

rearing to maturity from 20 to 30 eggs gratis and then distribute the birds in pairs or trios to State reserves or private estates if assurance can be given that they will be afforded reasonable protection. The eggs should come from at least two clutches so that we could mate the birds without danger of inbreeding. For the above purpose, I would also be willing to pay $1.00 apiece for up to 30 unincubated wild turkey eggs, payment to be made upon hatching of some of the eggs at least. In clearing forest land and in logging operations in the southern Appalachian Mountains, nests are sometimes disturbed and deserted, so that no loss would result. Or if a nest is located and the eggs taken as soon as the clutch is complete and before incubation begins, the bird will probably lay a second time, and thus little loss would occur. At any rate, on finding a nest, it would be advisable to telegraph me at my expense and receive a reply before sending the eggs.

The Prairie Chicken. Nests are often broken up during spring plowing or haying. It is desirable to domesticate and reintroduce this species into its eastern habitat. As above, I will pay for unincubated eggs $.25 apiece and all expenses of collecting, telegraphing and express for the chance of helping in this work.

The Bobwhite or American Quail—This bird is beginning to be appreciated as probably the most effective insect destroyer of the field and garden. Innumerable nests are broken up in haying and harvesting. If incubation has begun, these eggs may be saved by wearing them in the crown of a hat until they can be slipped under a brooding hen. In this way the writer has had ruffed grouse eggs carried as much as a day in any stage of incubation and all have hatched perfectly. The eggs may also be hatched in an incubator by giving long periods of cooling—one to two hours—in hot weather. It would be well in connection with this important work if the children kept a few cochin bantams and let them brood all summer, for quail nests may be broken up while cutting the rowen in September. The writer has bobwhites hatched September 13 and by November 1 they were scarcely distinguishable from birds hatched earlier.

No birds make more charming pets and the quantities of injurious insects which they destroy ought to give them the place of honor in every garden and field in the land. A bobwhite hen ate 1286 rose slugs July 2 and laid the first of 20 eggs July 4. Another

ate 568 mosquitoes in two hours. Another ate 5,000 plant lice in a day. "A tablespoonful of chinch bugs," "over 100 potato beetles" in a crop and representing a single meal, are reports from government experts. In the warm months the quail eats largely insects and during the cold months specializes on weed seed. If the estimate of insect damage at $800,000,000 a year is correct, this one bird might save half of this tax, if given a chance to do its work in nature. Might not nature-study at least try to give this species its chance?

The writer is now engaged in rearing bobwhites with this end in view, and in order to secure the most vigorous stock possible, he would like to obtain unincubated eggs from widely different parts of the country. He will pay all expenses of collecting, packing, telegraphing and expressing, and, if successful in hatching and rearing, will return at least one pair of breeding birds for each ten eggs received. No cash is offered for fear that it might result in nest robbing, and it is desired to save the eggs only in nests unavoidably disturbed which would otherwise go to waste. If in doubt as to the age of the egg, an egg-tester will show the embryo or one should be broken and carefully examined. All eggs with visible embryos in them should be retained for local rearing, possibly at home or, probably better, until methods are perfected, at the nearest State game commission hatchery. Quail reared in domestication are held at from $3.50 to $5.00 per pair. Properly supplied with insect food, they are reasonably sure to breed and will produce from 15 to 30 eggs per hen per season, of which nearly 100% are fertile.

Ruffed Grouse, or American Partridge ("Pheasant" in Southern states) Bonasa umpellus and B. togata—Work in domesticating this species is now entering its sixth season and is being carried forward under a grant from the Carnegie Institution. The former flock was poisoned with arsenic by cat fiends, but the past season ten fine specimens have been reared from the egg. The hen has been demonstrated to carry an internal parasite which is fatal to grouse, but it has also been discovered that by the brooder we can rear practically every chick hatched.

In order now to collect the best possible stock with which to establish a domestic strain, it is desired to gather eggs from many different parts of the range, north, south, east and west. In this collection of living birds we may be able to discover where dif-

ferent varieties occur and where the species attain its largest size and most vigorous development. The object is to learn the biology of the species, including its practical propagation, in order to insure its safety on the American Continent. To all who assist due credit will be given in the final monograph which is in preparation. First, send in all unincubated eggs from nests that have been accidentally broken up. Simply express to me, collect, and write information about the eggs that you may have, location of nest, date and address. I will reimburse all co-laborators to the extent of necessary expenses in collecting, packing, and telegraphing. In order to insure securing eggs from the entire range, I may also be obliged to ask that a few nests be collected that are not broken up. In case of finding a nest, before disturbing it, telegraph me and await a reply. The ruffed grouse must be reared away from ground contaminated by poultry, the chicks require to be fed largely on insects, and it is not advisable for an amateur to attempt to rear them without special instruction.

I hope the nature-study movement will take on the preservation of our game birds. The work should extend to our waterfowl, shore birds, doves, to all our grouse, quails, and possibly to the species that have been imported as well. For American nature work, however, we should first deal fairly by our native species.

I must add in closing that my own time and resources, as well as knowledge, do not permit of my trying to handle species other than those mentioned above, the wild turkey, bobwhite, ruffed grouse and passenger pigeon and prairie chicken. In sending eggs, great care should be taken to secure the necessary permits and not contravene any of the game laws of the different States.

NATURE-STUDY AND SCIENCE NOTES.

[Editor's Note. This department is conducted by Chester A. Mathewson, of the High School of Commerce, New York City. Notes and suggestions may be sent to him in care of the editor of The Review.]

Nature-Study in Connecticut. One of the most interesting pamphlets for the guidance of teachers in this work that has come to our notice in a long time is that written by Professor H. N. Loomis in the Connecticut School Documents series with the title "Lessons on Plants." It consists of sixty-two pages, embracing in a comprehensive way the following topics: Germination, roots and soil, buds and stems, leaves, flowers and fruits. The booklet bears evidence of having been carefully worked out, and the general plan of it seems admirably adapted to the end in view, which is obviously to place before the teacher very definite and concrete materials to work with, together with directions for handling these materials.

There are sixty-four exercises and experiments in all. In many cases an experiment or exercise is followed or preceded by an elucidation or amplification, and the exercise being in bold type makes it quite easy to distinguish between the two kinds of matter contained in the pamphlet. In order to make it easy for a teacher to do the work the State has provided sixty cabinets of materials. Any Connecticut teacher may secure, gratis, one of these and keep it for three months. Professor Loomis reports that these cabinets are out the greater part of the time.

As to just how much of the subject matter would measure up to the "established principles" of nature-study, which are fast securing recognition, we are somewhat in doubt. The topics are for the most part taken up in such a vivid manner that it is hard to see how they could fail to arouse interest. This certainly is a most important advantage. On the other hand there are a number of topics whose value must be questioned on the ground of their lack of connection with the every-day life of the child. It seems safe to say that we now recognize the fact that we must eliminate scientific minutae from our nature-study courses, however fascinating they may seem to us. Thus, for example, we find, (page 33) an exercise which includes these questions: "How many buds are there on the shoot or branch? How many last year leaf scars? If they are unequal in number, how can you account for the difference? Assuming that every bud produces a branch which bears the same number of buds that this shoot produced last year, work out [sic] what would be the number of branches borne by the simple twig at the beginning of the sixth year, assuming that no buds were suppressed or killed, or, in other words, ignoring the laws of struggle and survival?" Following this is an exercise on the "nature of the phyton." It is easy to see in all this the mind of the trained scientist working toward abstractions which are important to him. It would seem difficult to find adequate reasons for including such details in nature-study work. So, too, with an experiment on page 51 entitled "Effect of Sunlight on Chlorophyll." Here we have the question "What rays does the chlorophyll absorb?" Such a question can hardly be reconciled to the principle that nature-study must approximate the every-day life of the child.

To Keep Cut Flowers. Violets: in bowl of fresh water, cover, cold room at night; not in a draft in daytime. Flowers in warm room: put small pinch of salt in water. Holly and other woody stems: peel bark from lower stem and put peeled part in water. Flowers with porous stems (like asters): small piece of charcoal in water: Heliotrope: revived by adding small drop of camphor to water. These are recommended in the *Garden Magazine*. Will some readers try to find out the best methods for keeping flowers in schoolrooms and report to THE REVIEW?

Reasonable But Unreasoning Animals. In the *Outlook* recently, Mr. John Burroughs again attacked the problem which he once discussed so well in the "Ways of Nature." The following extracts indicate his main points in his discussion of the question "Do Animals Reason?" which he answers in harmony with the leading modern comparative psychologists who agree with Lloyd Morgan that animals "do not perceive the *why* and think the *therefore*."

"There is much in a hasty view of animal life that looks like reason, because instinct is a kind of intelligence and it acts in a reasonable manner. But when we get something like an inside view of the mind of the lower orders, we see how fundamentally it differs from the human. And we get this view of it, not in the ordinary course of the animal's life, because the ordinary course of its life is appointed by its inherited instincts, but under exceptional conditions, when it is up against a new problem. Now, when a reasoning intelligence is confronted by a new problem, it recognizes it as such, and, having a fund of knowledge and experience to draw upon, it proceeds to deal with it accordingly; not so the animal. It does not know the new problem when it sees it, and in its dealings with it acts much like a machine that was made to do something else.

"Take the case of a robin or a bluebird fighting day after day its reflected image in a window pane and never discovering how it is being fooled, or of the birds that Darwin saw in South America drilling through and through an artificial mud wall, mistaking it for the clay bank in which they nested like our kingfisher. Such instances reveal as by a flash of light the nature of animal mentality—how blindly, how unreasoningly the beasts act. If a person ever behaved in that way, we would say he had lost his mind, reason was dethroned. We would not merely say he was unreasonable, we would say he was insane.

"In its ordinary course of life the animal behaves in a reasonable manner, its course of action follows regular lines. Its progenitors have followed the same lines for countless generations; habit has worn a groove. But when a new, unheard-of condition confronts it, then there is no groove and its activity takes these irrational forms. When the phœbe-bird covers her nest in the ledge with moss, she does a reasonable thing; she blends it with the rock in a way that is both good art and good strategy. Now, if this was the result of reason, when she comes to the porch and to newly hewn timbers she would leave the moss off, because here it betrays rather than conceals her nest. But she sticks to her moss wherever she goes.

"Such natural history facts as the above, I say, reveal in the animal world an order of mind that differs fundamentally from our own. Unless

we are to abandon that comparison and classification which is the basis of all our knowledge, we must call it by another name—we must call it blind instinct. It does not see the why of anything which it does.

"Touch the spring of an animal's instinct or inherited habit, and it responds; but appeal to its power of independent thought, and it is, for the most part, as helpless as any other machine.

"There are but few things we could teach the animals in their own proper sphere. We could give them hints when they are confronted by new problems, but these new problems in the ordinary course of nature rarely turn up. When the animals are confronted by conditions made by man, then man could give them valuable hints.

"Animals know what they have to know in order that the species may continue, and they know little else. They do not have to reason because they do not progress as man does. They have only to live and multiply, and for this their instincts suffice them. Neither do they have to have any of our moral sentiments. These would be a hindrance rather than a help, and, so far as I can see, they do not have them."

Molasses as Feed. Experiments on horses and cattle show that molasses has a high value as stock feed and also increases the digestibility and palatability of hay and grain feeds with which the molasses must be mixed. [*Exp. Station Record*]

Staff-tree. It has often been stated that in times of famine some tribes of North American Indians have made use of the bark of this tree. Recent experiments made at Harvard University show an abundance of carbohydrate food in the bark. [*American Naturalist*]

Peat for Paper. An English company using American patents has started a large factory in Sweden for making pasteboard and wrapping paper from peat. This will tend to lessen the enormous demand upon our forests. The world's supply of peat is so large that it will not soon be exhausted by this new industry. [*Garden Magazine*]

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[MANAGING EDITOR'S NOTE.—The material for this number has been collected by Dr. H. W. Fairbanks, of Berkeley, Cal. The articles are all by California teachers, and largely deal with the various aspects of nature-study in that State.]

THE PLACE OF NATURE-STUDY IN THE NORMAL SCHOOL

By LOYE HOLMES MILLER
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The presence of any course of study in the normal-school curriculum is dependent on two factors: (1) its so-called culture value and (2) its value as professional training. The extent to which the first factor should be considered is dependent upon the preparation which the entering student has had. The second point involves the questions of demand for the subject in the course of study for the public schools and of the difficulty of presentation of that subject.

Whatever the attitude of mind toward nature-study *as it is*, all must concede that the study of nature has a culture value unsurpassed by any of the branches of learning. The old conception of the plebeian caste of natural science has crumbled in ashes along with those scholars who conceived or who championed it. We can not but agree upon the desirability of an acquaintance with nature on the part of the student. The consideration of the first point then becomes a consideration of the student's preparation for matriculation.

Students come to this normal school with the same preparation as to the State University. All have had one science course, many have had two, a few offer three, almost none offer four. Of

the sciences offered, physics is the most constant, because this subject is given in the high schools as college preparatory work. Some high schools recognize two classes of physics work—one to prepare students for the colleges of applied science at the universities, the other to give the literary student a measure of manual training through the laboratory practice. In the one group of students it inspires or fosters the spirit of the mechanic or of the engineer; to the other group it remains a bugbear that must be gotten through with in order to satisfy the requirements for college entrance.

Chemistry, as given in the high school, is too often of no value or interest to the pupil after he leaves the laboratory.

Botany, zoology and physical geography, the sciences which would contribute toward a nature-study preparation[1], are offered by a very small proportion of applicants. The work done in the biological sciences is morphological and systematic, sometimes physiological, almost never dynamic. Such preparation is of some value for nature-study in acquainting the student with terminology and with some facts of general interest, if both of these phases of knowledge are not used improperly. The cases are more rare, however, where they afford an enjoyable personal acquaintance with the organisms studied. In the writer's own case, he was a graduate student doing research work with a certain group of animals, working over preserved material for months before he saw the live animal and appreciated its delicate, translucent coloring.

The sins of the educational father are visited upon the children even unto the third and fourth school generations. The college graduate, teaching in the high school, given the same kind of work as he himself is most full of, does not stop to consider that the university might have been training him for research in pure science or for such applied sciences as medicine, sanitation or plant pathology. The high-school graduate, certificated by examination, teaches such science as he has not forgotten and calls the result nature-study.

The experience of the writer thus far is that, even to the student matriculated with credit in several sciences or to the college

[1EDITOR'S NOTE.—The author obviously has in mind biological nature-study, but such limitation of nature-study is disappearing rapidly.]

graduate with credit in science courses, the nature-study attitude is a new, fresh and altogether delightful point of view.

The second point, that is, the demand for nature-study in the public school system is a question of the present and of the future. The present demand is rightly insistent, the future demands that we who teach the subject should make good. Nature-study must meet the expectations of those who have called for its introduction. To this end we need trained teachers who can make the subject effective.

The difficulty of presentation lies, to a great extent, in the fact that the teacher has not the proper viewpoint. As a result nature-study becomes either elementary science on the one hand or the coddling of a false sentimentality on the other. The object of nature-study is not to impart knowledge but to train the power of attaining knowledge. It is not to inspire sentimentality but to arouse sympathy free from affectation. Between the Scylla of science teaching and the Charybdis of sentimentality lies the course that nature-study must navigate. The normal schools and colleges which train teachers must act as pilots.

NATURE-STUDY IN THE SAN DIEGO STATE NORMAL SCHOOL

By WM. T. SKILLING
Supervisor of Nature-Study and Geography

In this school the two subjects, nature-study and geography, are in the training department given equal time and emphasis throughout the course. Both are begun in the third year and both are continued through the eighth year. One period of forty-five minutes is devoted daily to the two subjects, half the period to one and half to the other. In the seventh and eighth grades alternate days are given to one or the other, instead of dividing the period, in order that the work may be more thorough.

There is no special effort to have the work of the two subjects closely correlated throughout the whole course, but in the lower grades especially, the nature-study work greatly strengthens that of geography. There is, however, complete divergence in the eighth grade where physiology and hygiene furnish the subject-matter for nature-study.

The object of nature teaching is to give children the seeing eye and the hearing ear, so that the child will not be blind to the fleecy cloud and the spring violets, nor pass by the cricket's call and the thunder clap without the mind being stirred to some thought as to the cause of each.

In the mind of the infant and of the savage there is little wonder or admiration evoked by witnessing the most intricate and delicate mechanism or the most marvelous phenomenon. Everything in nature is taken for granted by the immature or untutored mind, and nothing, be it ever so strange and interesting, calls forth much intellectual activity. Well is it for the infant that this is so, for otherwise it would die from nervous prostration before arriving at school age.

It is the province of the school, and especially of the nature-study class, to prevent this state of mental lethargy from extending into adult life as it does in the savage.

Nature-study, then, is fundamentally a training of the observant powers of the mind so that sense stimuli becomes transformed into mental stimuli; so that when any of the five senses receive an impression the *mind* receives an impression; so that

our *surroundings* make us *think*. This was the object of the old-time object-lesson, but in the hands of unskillful and superficial teachers so little information of any vital interest to the children was brought out that the method soon fell into disrepute. In so far as the object-lesson trained the mind in observation, it was fulfilling an important mission, but it usually failed in doing this for the reason that facts presented to the child about the objects were not, to his mind, of sufficient importance to make him crave more of them.

There is a vast wealth of facts in nature lying just below the surface, if we will look for them, which the child has never realized and which he will appreciate if rightly presented. There are wrigglers in the stagnant pool and buzzing insects in the air all about us, which, if seen by the child using the microscope, a very valuable adjunct to the nature-study equipment, are full of interest and instruction. There are physical and chemical facts of which most teachers have considerable knowledge, which if presented to the child accompanied by sufficient illustrative experiments can not fail to stimulate thought and incidentally to increase his love of school.

Nature-study is frequently called elementary science. "Science" is a very indefinite word if taken in its literal sense and means simply knowledge. With this liberal definition of the word no harm can be done to the cause of nature-study by burdening it with this rather pretentious word. But if we mean by science what is meant by scientific men, namely, a systematic *classification* of facts accompanied by many technical terms and the deduction of facts from general principles, then we kill nature-study by making it a subject entirely unsuited to the child mind.

To the children generalities are meaningless because to be comprehended they must rest upon a multitude of concrete facts which as yet are not a part of the child's mental equipment. Technical terms are in themselves valueless and should, as far as possible, be avoided. Many a teacher has imagined that her little children were adepts in the knowledge of flowers because they could glibly tell you the names of all the parts of a plant and the number of each, although their attention had never been directed to the study of flowers themselves and their habits. The letter killeth; but if the *spirit* of nature-study asserts itself in the

mind and heart of the child his observant power will be cultivated, his interest in the world increased, his character developed.

Nature-study, then, is not the study of science as we usually interpret the word, referring it back for its meaning to courses labeled science which we took in the university. It is rather a study of the concrete things about us, paying more attention to individual examples than to relationships and underlying principles. The foundation must be laid before the superstructure is erected. The child can not generalize without concrete material with which to generalize.

Nature-study, then is not science, but is a valuable preparation for the study of science. It furnishes mental images without which science study would be an abstract, meaningless subject. Not only does the early childish study of flowers and animals pave the way to an intelligent study later of botany and zoology, but nature-study throws a flood of light upon the subject of geography.

To show the relationship between nature-study and geography it is necessary to free nature-study from the restricted definition tacitly given it in the minds of most teachers, namely an elementary study of botany and zoology. It includes these, but it also includes a study of those fundamental laws of nature which can be easily demonstrated in concrete ways and which we call physics and chemistry or natural philosophy. A knowledge of these laws will make clear many geographical topics such as winds, rainfall, climate, etc.

Instead of narrowing nature-study down, as has been done so largely, to a study of flowers, there is no reason why it should not include that great mass of facts lying all about us which are the results of human nature acting upon lower nature. This would open the door of the nature-study class upon all those materials and activities of our neighborhood which we designate in geography as "products" and "occupations." In other words nature-study would in fact be identical with what we are familiar with as *home geography*.

That part of nature which affects human life most is of most importance to us. Things in nature with which we come into daily contact are most worth studying. The study of a forest tree as it stands unmolested by man upon the mountain side may be made to stimulate the student's love for the beautiful and thus serve an important ethical purpose. But the further study of

that tree after it has been cut down and taken to the paper factory or the saw-mill is a vastly more suggestive and many-sided consideration. We are still dealing with nature, but nature now in the hands of man. We are taking into account *human* nature and are close upon the realm of geography.

As an illustration of this sort of nature-study, suppose we take the building of a house. From the drawing and blue printing of the plans to the planting of a lawn and suitable shrubbery the lessons may be made exceedingly instructive and interesting. No one would deny that a study of minerals is legitimate nature-study. But the mixing of paint and the preparation of plumber's and tinner's materials is *applied* mineralogy, and therefore doubly valuable. The drawing of plans, though of practical value and great interest to older children, is not in itself nature-study, but the making of a blue print is a natural phenomenon, the study of which leads the way to that most interesting realm of nature, photography. The study of different kinds of woods used in the construction of a house forms a fitting close to the study of the trees themselves.

There are physical laws which find themselves illustrated in the plumbing, the gas-fitting, and the wiring. In short, although the house is a work of art rather than of nature, the artisan employs the materials and forces of nature, so with the proper treatment, instruction in house building may be made excellent nature-study.

The relationships existing between successive topics in the following brief outline may not be apparent to the reader, but in the teaching their interdependence is seen. As for example, why bees are taken after flowers is clear when we consider that the life of plants is largely dependent upon the pollen distributers.

In the selection of material throughout the whole course, the controlling thought has been to lead up through plant and animal life and the conditions that surround them to the higher life of man and his environment, including those conditions which are necessary for perfect development which we call hygiene.

In the third and fourth grades the germination of seeds and the growth of plants is taken along with conditions of soil and air which make such life possible, and those animal forms which are intimately associated in some way with such plant life.

In the fifth grade are studied those forms of plant and animal life which exist in the sea and the desert where environment is so vastly different from that previously studied.

In the sixth grade the forces of nature, chemical and physical, form the subject-matter, leading up to a study in the seventh grade of agriculture and forestry, and in the eighth of physiology and hygiene.

The school-garden, consisting of a fenced plot of ten thousand square feet back of the building, is of great value in the study of soil, germination and plant growth generally. It furnishes a ready means of making the work concrete. It helps to make the connecting link between nature and the child's mind.

In the third, fourth and seventh grades the nature-study work is of such a character that it can be largely illustrated in the garden, and these grades are often taken to the garden at the recitation period. A sufficient number of hoes, rakes, spades and watering pots are furnished by the school so that all the children in a grade may work at once.

Experiments with fertilizers are made and some fruit trees will be planted for experimental grafting, and grapes for propagation by layering.

In addition to the garden, there are more than twenty varieties of ornamental trees and shrubs growing upon the grounds, and others within easy reach of the school, the names and habits and origin of which form an essential part of the course. It is important to know the kinds of trees adapted to our climate and the conditions under which they thrive best. Were such knowledge more general and an interest in trees awakened our cities would become beautified to a far greater extent than at present.

Following is a brief outline of the principal topics taken up in the various grades:

Outline for Six Grades

Third Grade.

A study of many different kinds of seeds. Planting seeds in the school-garden. Conditions, observed in the garden and discussed in the class-room, which are favorable or unfavorable to the growth of seeds and plants.

Some birds which feed upon seeds. A study of stems. Of Leaves. The horse (whose food is leaves). Roots—A study of the gopher, a feeder upon roots. Flowers. Bees (the distributers of pollen). Seed dispersal.

Fourth Grade.

The work here is of a similar nature to that in the third grade, except that different birds, animals, insects, etc., are taken.

A study of the mosquito. Lessons upon its habitat, swampy places, their causes, means of draining, swamp vegetation, malaria. Soil and soil water, seeds. Work in school-garden. Birds—ostrich, pelican, sea gull, etc. Stem and leaves. Cow and dairy products. Roots—The earth-worm (being of use to roots). Flowers—Butterflies (or silk-worm). Seed dispersal. Physiography of plants.

Fifth Grade.

This grade is devoted to life of the sea and desert, both animal and vegetable. A good collection of preserved specimens is at hand to make the instruction concrete.

Coelenterates (Hydrozoa, sea-anemone, coral, jelly-fish, etc.). Starfish, crabs and barnacles. Insects. Desert animals. Frog. Desert conditions and desert vegetation. Adaptation to environment.

Sixth Grade.

Devoted to natural phenomena. Air, its composition, etc. Temperature. Winds. Water, its forms and uses. Combustion. Respiration. Fermentation. Decay. Inertia. Gravitation. Centrifugal and centripetal forces. Work. Machines. Heat. Engine. Gas-engine. Sound. Light. Magnetism. Electricity.

Seventh Grade.

A thorough study of the soil based upon some elementary book on agriculture. Cereals and other important farm products. Forestry. Fruit trees of California, including grafting, tree pests, etc. Work in the school-garden. In connection with forestry a study is made of the building of houses. This study is based upon excursions to the saw-mill and to a house in course of construction. Names and habits of the ornamental trees of the neighborhood.

Eighth Grade.

Physiology with special reference to hygiene. The skeleton. Muscles. Digestion. Circulation. Respiration. Nervous system. Eye, ear, taste, feeling, smell. First aid to injured.

NATURE-STUDY IN THE CALIFORNIA STATE NORMAL SCHOOL AT CHICO

By RILEY O. JOHNSON
Head of Department of Biology

The work in nature-study at this institution is made to center about the school-garden. The main garden is a plot of ground containing something more than a half acre. Also several smaller plots about the campus are utilized for garden purposes, making the total amount of ground under cultivation about one acre. Each pupil in the training school has a garden all his own in which he plants and cares for radishes, lettuce, beets, and a few other vegetables, as well as nasturtiums and a few other flowering plants. The older pupils also do work in budding, grafting, and practice the various methods of plant propagation.

The garden furnishes us with abundant materials for lessons with plants. The relation of plants to moisture, to light, to temperature and to different kinds of soil, are all carefully observed and the various adaptations enabling them to sustain these relations are worked out with the pupils. The necessity of irrigation during the dry season affords opportunity for experimenting to determine the optimum amount of water required for any given plant in the garden. Surface cultivation as against deep stirring of the soil is also tested in connection with the varying amounts of water used in irrigation.

During the last year the depredations of insects, notably of plant-lice, led us to consider the structure and habits of these pests and to experiment on different means of eradication. First, natural means were tried. Several of the pupils had seen ants in attendance on plant-lice, so a number of these were brought and placed with plant-lice to see what was the real relationship existing between them. After this had been determined, lady-bird beetles were brought, and also the larvæ of the lace-wing fly.

After a time there were immense numbers of the plant-lice and the few predaceous insects which had been brought could not effectually hold them in check, so more drastic measures were determined upon. Various sprays were tested, among which a kerosene emulsion was found to be most effective. Some of the plant-lice isolated and reared in captivity showed us how rapidly

they multiply and also demonstrated to us the fact that not all insects come from eggs previously deposited by the mother. We are hoping for an opportunity, which will no doubt come this autumn, to see in our gardens the work of still another of nature's checks on these pests, namely, the parasites which infest them and keep their numbers effectually reduced.

Further opportunity for the study of insect friends and foes is afforded us in the great variety of scale-insects to be found on the various plants of the campus and on the fruit trees in the immediate neighborhood. The fact is thus impressed upon us that there are comparatively few plants which are not infested with some sort of scale-insect. We are further furnished with the strongest motives for seeking to find the best means of eradication. All discussion of the means of control must of course be preceded by an examination of the structures of insects and careful observation of their habits of life, etc. Wherever possible all the means which nature has provided (such as parasites) must be encouraged. Thus pupils are led easily to distinguish between the noxious and the beneficial, and to seek to destroy the one and to preserve the other.

Some damage was done to our cabbages during the latter part of spring, and it became an interesting problem to determine what bird was the guilty one and to devise means of preventing the injury. After the offender had been identified, observation and reading brought us readily to the conclusion that the slight toll taken from the cabbages was all too little recompense for the injurious insects and noxious weed seeds eaten by this same feathered intruder. Thus a new appreciation for the birds was brought about by this incident of the garden and a desire was created to find out by observation (supplemented by reading) as much as possible concerning the other birds of the locality, their recognition, food and nesting habits, food of nestlings, etc. The literature of the Audubon and humane societies, national and state, and the numerous pamphlets from state experiment stations and the Department of Agriculture did good service here.

At the close of the summer vacation the children returned to find that their gardens which had been left in good condition in June were now overgrown with weeds. They naturally asked, "Where did all these weeds come from?" Thus the way was prepared very naturally for a study of the migration of plants, and

more particularly in this instance for some experiments on the vitality of seeds and methods for effectual eradication. Many of the weeds in the garden had borne seeds and thus furnished materials for a study of adaptations for dispersal by various agencies. Bird visitors to the gardens during the early days of the term were watched intently to see what seeds were preferred by the different species. Thus the birds, touching us, as seen above, in two vital points, call forth a natural enthusiasm in bird study.

After the garden had been reclaimed the natural interest of the children led them into a desire to make excursions into the immediate neighborhood for the purpose of finding what garden weeds grow also in the open. Also to see if they were as successful in their competition with other wild plants as they had been with the cultivated plants of the garden. They were also curious to know the names, and something of the habits and adaptations of other weeds of the locality and thus an interest has been aroused in making a natural history survey of the vicinity as it applies to weeds. This will be extended later to include all forms of animal and plant life.

In their study of weeds and the miscellaneous plants about the campus the pupils have noticed that plants are often infested with galls, and that these are sometimes of animal (generally insect) and sometimes of vegetable origin (fungi). So a way is opened quite naturally for the study of plant disease in general. The consideration of plant pathology (admirably illustrated for us in pear blight) leads easily and naturally into bacteriology and opens up the very interesting relationships of plants and animals to disease in man. Pupils will also notice in their study of weeds that insects are often helpful in destroying noxious weeds and will be led further to observe structures, habits, and adaptations of these to their environment.

Comparative study of a few plants has aroused an interest in the relationships of plants to each other, and the ability to recognize a new plant is immediately followed by a desire to know whether any of those formerly learned are related to it. In answering this question pupils compare structures, habits, etc., form a judgment in the matter and then go to the teacher or to the book for confirmation. Comparison of the roots of any considerable number of plants will lead to the discovery that the

leguminous plants have tubercles on the roots, thus we are brought around once more to those very interesting organisms, the bacteria, and we find them playing an entirely different rôle in nature. It is further seen that plants belonging to the same botanical family are often infested by the same species of insect or plant disease, thus the pupil has a new (if not very accurate) means of determining relationships. He will be interested in trying to find insects which are partial toward certain plants and what plants suffer most from depredations of insects. Learning the relationships of plants to each other serves to organize in the pupil's mind the bits of information he is picking up here and there concerning plants.

There has long been a sentiment against learning merely to recognize animals and plants so as to be able to call them by name when seen. Nevertheless such ability very often leads to a desire for a more intimate acquaintanceship. We are making use of this as one means of arousing an interest in nature in the classes of both the normal and training departments. The results are very gratifying, for students and pupils after learning the name, are in most cases desirous of making an examination of the organism in order to find in what respects it differs from or resembles other organisms of its kind. Moreover, unless one knows the name of the plant or animal under consideration he is unable to get any help whatever from books concerning it. We are seeking in all our nature-study teaching first to get the pupil and student to *see* all they can and then by references to the literature of the subject in question to arouse in him the desire to investigate further. In this way the spirit of nature-study will develop into the true scientific spirit.

From the above it will be seen that the school-garden furnishes us with material in abundance for all our nature-study work, and with more than we can find time for, though each class gives a part of every day to the subject. What shall be raised in the school-garden and consequently what shall be the materials of nature-study should be determined by the locality in which the school is situated. In California, where gardening and horticulture are carried on so extensively and where so many noxious insects and plant diseases occur, we feel more than justified in shaping the nature work as indicated above. The children of our State should be enabled through what they learn in the public

schools to recognize easily the various insect pests and plant diseases and to know something of the methods of eradication. Furthermore, they should be taught how to use intelligently the vast bulk of literature issued by State and nation each year in the interest of the rancher.

While we have not in the past made the nature-study work coextensive with the work in geography, yet a great deal of the geography work up to the fifth grade has been taught in connection with nature-study. It is a matter of common note that pupils who have taken the greatest interest in the study of nature are our strongest pupils in geography. We believe that the relationship between these two studies should be developed as closely as possible through the first four grades and we expect constantly to keep this point in view in nature-study work in future.

Our plans for the coming year include a line of experimenting to determine what plants can be grown in our gardens through the winter season, in addition to the already great variety of plants on our campus (removing some which are duplicated three or four times), and greenhouse experiments in forcing. We shall also do some work next spring in the construction and planting of ornamental beds. All this work is to be done by pupils and students under direction.

During the time our students are with us they are expected to learn to recognize the two hundred fifty or more plants (cultivated and wild) that grow in and about Chico, the common birds of the locality and about fifty of the insects of greatest economic importance. They are required to learn by actual experience the methods of plant propagation, care of plants and how to direct garden work generally. They are further required to familiarize themselves with the literature of school-gardening and nature-study in general by being often referred to bulletins and books; and they are encouraged to begin at once the collection of such literature as is inexpensive and not cumbersome. The Biology Department of our school has a library separate from the school library, and in this are contained more than twenty-five hundred pamphlets (most of which have been collected in the past eight months) and the best books to be had on the subjects under consideration in this paper. We also receive regularly about two dozen periodicals (most of them weekly) on agriculture and horticulture.

Judging from the enthusiasm which our students are showing for the subject, and the great possibilities of the work when in the hands of well-trained teachers, we predict for California very shortly a new era in its educational progress.

THE PRESENT NEEDS AND THE OUTLOOK FOR NATURE-STUDY IN CALIFORNIA

By CHARLOTTE M. HOAK
Los Angeles

The nature-study idea is not new to California, but we are slow in working out our practical demonstrations of its theories. Except for splendid work done here and there by those bold enough to be pioneers in the field, little has been accomplished toward getting the work firmly rooted in our rural and city schools. Aside from laying out provisional outlines which are still just so much untried, or little tried, material in our courses of study the whole matter is practically at a standstill. At this uncertain stage we need: (1) a true conception of the nature-study idea; (2) a realization of its practical values; (3) a nature-study outline and manual that can be used as a guide for California teachers in the grammar grades in both city and country schools; (4) trained teachers; (5) a familiarity with our own field of work that will give the California nature-study broadness of outlook and originality in the application of nature-study principles.

It is first necessary that we get our bearings with reference to the nature-study idea. At the present time nature-study is interpreted to mean almost anything from the elementary agriculture taught in our normal schools to the sentimental effusions given by many of our well-meaning teachers. To those of the biological bent it means anything from simple lessons on plants and animals to elementary biology and practical physiology. To those who revive their recollections of the old "object lessons," it is informal teaching about natural things. The adherents of the physical sciences claim recognition and advocate a free use of the simple phenomena of the inorganic world and present a wide range of material selected from the fields of geology, physics, chemistry, astronomy and physical geography. To those who have no special bent, but are truly interested in the

welfare of the child, nature-study is primarily an effort to place the child in direct, harmonious and sympathetic touch with his environment.

Any or all of the above fields are available, provided they furnish material having common interest or that vital intrinsic value that will stimulate the latent activities of the child. Nature-study is not science neither is it elementary science. It selects material from the same field as the sciences, but the point of divergence is the use made of the material. The jist of the whole matter was long ago succinctly expressed by one of our leaders in the nature-study thought who said, "The keynote of all nature-study is sympathy." Science on the other hand allies itself with the formal, comprehensive, and more or less complete addition to the sum of human knowledge. Having grasped this underlying principle, sympathy, we may widen our vision until it includes the whole range of natural phenomena, realizing at last nature-study is not restricted to one line of investigation and owes much of its very power to the fact that it deals freely with the raw materials of all the sciences.

The primacy given to the biological sciences has been too well established and exploited to need further discussion; but hitherto we have been somewhat reluctant to admit into the "charmed ring" the so-called "physical nature-study." Now, there are many things in the inorganic world which are of common interest, of vital human importance which we pass by because we, a book-trained generation, have first become familiar with the abstract phases presented by the formal sciences of astronomy, geology, physics and chemistry. The simple facts of the inorganic world always appeal to the child. Approached from the child's point of view, the earth, the air, the sky, the properties of matter, the forces of nature are all full of absorbing interest. Let any teacher who doubts the truth of this statement take an inventory of the confiscated toys in her desk. Has not the growing boy a perennial interest in such mechanical toys as compasses, motors, bells, and a legion of other practical demonstrations of the application of the formal laws set down in physics? Even the youngest child is interested in the mystery of the heavens, and it is quite possible to teach the children in the grades simple facts about the sun, stars and constellations without even mentioning the nebular hypothesis, or going into the intricacies of astronomical calcula-

tions. Sympathetic touch with the beauty, order and immensity of the universe should be one of our earlier lessons and where is it better exemplified than in the starry heavens? Much of the physical nature-study work, especially in the lower grades, may be correlated with the observational geography. Phenomena of the weather and climate, simple lessons on temperature, wind, clouds, the seasons, observation of the simpler and more superficial features of the home geography, lay the best and truest foundation for the more formal study of geography later on. With the child's bottle of pebbles as a starting point we may make excursions far afield into the realm of rocks and minerals. Material from the realm of chemistry has long been so popular that it is hardly worth while to re-discuss the matter here. Thus we see that we should omit nothing from our nature-study courses that will widen the outlook of the child, and we are at liberty to make free use of all or any material that may be utilized to excite a living and lasting interest in the world about us.

In our present embryonic and experimental stage of development it would be well if we could keep in mind some of the practical values that have already been accredited to nature-study wherever it has been given a fair show to work out its ideals. In Europe, in Canada and in many of the eastern states it has already been clearly demonstrated that this new movement "nature-ward" is one of the most vital, wholesome, and sane, as well as an effective and practical method, yet put forward to advance the cause of true education. Here on the Pacific Coast we need to put ourselves in sympathetic touch with the great national movement and after having gained the inspiration of the higher ideals we will have the courage to strike out boldly and realize our own ideals in practical lines.

We have been inclined to place too much reliance on eastern authority and eastern texts, and we are just waking up to the fact that owing to peculiar conditions of soil and climate we have many original and distinctively local problems to solve. In nature-study we must learn the lessons that our farmers have already learned in the hard school of experience, that eastern conditions are widely different from those west of the Rockies, and many of the well-known practices as well as the demonstrable theories must here be thrown to the winds. We now feel confident

that a nature-study outline and manual adapted to this particular locality would be a great help. It must be a simple, comprehensive, flexible, non-technical text that may be used as a guide for the grade teachers in both city and country schools. It should present a suggestive outline of work in nature-study commencing with the lower grades and blending logically into the science work of the high schools in the upper grades. Aside from the outline, it should contain several sets of suggestive and simple lessons and experiments that have already been tested and will help the busy teachers to make the best of our available material in the best way. Lastly a helpful bibliography containing a list of the best books that have been written both on theory and in demonstration of successful practice might be appended.

One of our greatest needs is trained teachers. It matters little whether they be trained in the colleges or in the school of practical experience, if they are only able to meet and overcome the many obstacles that stand in the way of doing the proper kind of work. We have already begun to make a provision for this great lack by incorporating in our normal training schools for teachers courses in elementary agriculture. The task undertaken by the teachers of this subject is an arduous one due both to lack of genuine sympathy and lack of proper equipment for laboratory and field work. Few have courage to stick by the problem until they arrive at its ultimate solution. Our State University through its agricultural department has fostered this phase of the work and under able and efficient leadership has fought a good fight for its cause. It is now equipped with a splendid experimental farm, and we hope that this great open-air laboratory will prove a training school for teachers as well as for successful farmers.

To nature-study we look for efficient aid in the solution of many of our perplexing problems. A proper understanding and a practical application of its underlying principles will have a sane and wholesome influence on the school, the home, and the community at large. The rural school problem, the use of the school-garden, our forestry and irrigation questions, our relation to important matters of home, municipal and national hygiene, the nature, source and purity of our food supplies, the much discussed question of humane education, our attitude toward home industries—these open up a wide and interesting field wherein we can already see the promise of doing effective work.

The economic welfare of California has long centered and will center in the future around the rural industries, the basic ones being agriculture and horticulture. In spite of the fact that California's fame has gone forth as "the land of gold" in a literal sense, the following statistics prove something very contrary. Annually for the last few years the total value of the farm products has been over $132,000,000, while the mineral production has only amounted to $30,000,000.

The rural school has in no wise kept pace with this rapid development of rural industry. California has been strangely indifferent to the welfare of her country schools. Dr. True of the Dept. of Agriculture writes thus of our astonishing indifference:

"The writer went not long ago to a flourishing agricultural community in the midst of which was a fine and wealthy city. On invitation of leading citizens he went to a splendid high-school building in that city and addressed the teachers and students. In that school were gathered some six hundred active and intelligent American boys and girls. They were pursuing courses in English and other languages, mathematics, history, political economy, and a number of natural sciences. With much justifiable pride the principal of the school showed his visitor the good equipment for carpentry and wood carving. There was also instruction in various forms of commercial business. But agriculture and horticulture were entirely neglected. The farms and horticultural plantations surrounding that city aggregated millions of dollars in value. The prosperity if not the very existence of the city depended on the success of the agriculture in its vicinity. Grave evils afflicted that agricultural region, the removal of which required much intelligence and expert skill. Hundreds of the pupils attending that high school would naturally, if not necessarily, make agriculture in that region the business of their lives. Yet no pupil was learning anything about the requirements of successful agriculture or the aid science may give the farmer in his struggle with the forces of nature vitally affecting his business. The whole drift of the education given in that school was away from the farm. Could anything be more unwise? Is it not absolutely certain that, considering it merely as a matter of business policy, the taxpayers of that city could well afford to pay all the additional expense which would be required to maintain courses of agriculture in that school? Undoubtedly the farmers of the vicinity ought to share in this expense, and there is good reason to expect they would do so. There are hundreds of American communities where a similar state of things exists. The enduring prosperity of the city is inextricably bound up with the success of agriculture. Technical education has proved a sure road to commercial development and greatly increased wealth in connection with every industry which has received its benefits. It will prove equally so with agriculture."

It is with great regret that we notice this condition of affairs in our schools. The beginning of the change in our educational ideals was heralded in 1903 when the State Legislature passed a law making it possible to consolidate the rural school districts. This step, significant as it is as a beginning, will never have the desired effect as long as the country schools continue to follow the courses of study laid out for city schools. These courses must be reorganized and adapted to meet the needs of the rural communities. We believe that the nature-study idea properly applied will prove the means of solving many of the hitherto discouraging and perplexing problems which beset those who are working for the betterment of our rural schools.

The practical and far-reaching values of school-gardens have already been fully-demonstrated abroad, in Canada and in the eastern States. In California, however, the school-garden is in the experimental stage and we are just beginning to realize its possibilities. Surely California of all places ought to be a splendid field, because the climate and soil conditions are so favorable. Oakland and San Jose have established gardens in connection with their public schools. In the former over one thousand children possess gardens and work them *successfully*. The normal schools have for many years made gardening a center for their courses in elementary agriculture and the nature-study work of the training departments. Sporadically by civic clubs and others interested in bettering the conditions of the poor children, gardening has been used effectively in the slum districts of Los Angeles. The general adoption of the school-garden, however, is one of our "futures." It has splendid promises and is worthy immediate acceptance in both rural communities and large cities.

In the field of forestry and irrigation there is again room for practical nature-study to do effective work. The problem is just being brought home to us by the statement of Secretary Wilson who says: "If better care, a more general propagation, and a fostering of present conditions are not observed, the forests of the United States will be practically wiped out inside another ten years." We need to have the public conscience aroused to the realization of the crime it is committing against the welfare of the future generations by laying waste to our forests, and especially here in California, destroying our water resources. Why not be-

gin with the child? It lies within the province of nature-study to place the child in touch with these vital forestry issues. We may profitably learn a lesson from Germany, France and other European countries where the forestry resources are carefully conserved. In Germany especially a large part of the tree propagation is done by the women and children of the forest districts. What splendid work might be done right here in California; it would give profitable and enjoyable employment to many a boy and girl of our forest sections. Not only in the wooded districts might this work be carried on but many of the waste and barren places might be utilized and made a source of revenue by being planted to hardy and drought-resisting trees. Why not enlist the interest of the children?

Under the old régime physiology had much to do with the "dry bones" formal side and we have been inclined to cut it more and more from the curriculum of the common schools. Under the inspiration of the nature-study idea new fields have opened up. Instead of a physiological diagnosis of the technicalities of digestion, we have now learned it is better to approach the same subject by a series of interesting experiments on foods and food values, correlating the work closely with domestic science. More stress is laid on the simple facts of hygiene taught in such a way as to help the child to meet the emergencies of life and enable him to become an intelligent citizen.

Our food supplies, their nature, origin, and purity, put the child in vital touch with some of our great industries. It is not trespassing at all on the field of technicalities to teach the child the truth of the matter concerning our pure food laws. A knowledge of the subtile crimes committed in the name of industry might be used to open up the meaning of good citizenship to the child mind.

Humane education is at present receiving much attention in California. A committee of the Faculty of the State Normal at San Diego have issued a bulletin on this subject. Its purpose is to aid the teachers in the elementary schools in carrying out the provisions of a recent amendment to Section 1665 of the Political Code of California prescribing instruction in humane education. This provisional outline throws itself in line with the general trend of nature-study. The same work could be accomplished by nature-study which recognizes that the child is cruel and thought-

less in his destruction of animal life only because he has not a sympathetic knowledge of its proper place in nature's plan. Throughout the grades the child should not be taught to see animals, birds and insects with the eye of the zoologist, but rather to look on them as fellow creatures whose lives with their manifold doings become objects of sympathetic interest. The finest humane education comes through the channels of the unconscious positive training of a well-regulated nature-study course.

Sympathetic insight into the home industries falls within the limits of a comprehensive nature-study course. In rural districts and small towns there is an opportunity to see first hand the agricultural and horticultural methods pursued in the country adjacent to the schools. In the larger cities the child can be brought into sympathetic touch with the innumerable industries which keep the complex mechanism of city life going.

A consideration of our moral and civic difficulties viewed in the light of nature-study opens up a field of discussion large enough to occupy a separate paper. Only a few salient points can be touched in a paper of this type. Nature-study educates towards the simple life in an age where there is an inordinate love for material things, and a feverish struggle for wealth and power and position. Nature-study educates towards the healthful life by emphasizing in a thousand ways the old saying that it is of utmost importance to have a "sound body as well as a sound mind." These things alone which are the direct results of nature-study would amply justify our giving it freer scope in our educational system. There are other silent and indefinable influences which react on the public good and make nature-study worthy to hold both now and in the future a high place as a practical way of realizing high ideals.

NATURE-STUDY IN CALIFORNIA—A SUMMARY

By HAROLD W. FAIRBANKS, Ph.D.

Berkeley, Cal.

The following notes are based upon an examination of the courses of study of 42 out of the 58 counties in the state of California, supplemented by information gained at various county institutes. The counties from which no information was obtained are mainly the more remote and less populous ones so that we may safely say that 90 per cent of the schools are represented.

Of the 42 counties heard from, there are 34 in which nature-study has more or less standing. The remainder make no reference to the subject, or to any phase of it such as agriculture or "science." It would appear from the above statement that nature-study occupies an important place in the schools of the State; but the results of our investigation gives much less cause for satisfaction. In many counties in which the subject is referred to in the course of study, little if anything is attempted in actual practice.

There are probably no more than half a dozen counties in which nature-study receives its due attention at the hands of the framers of their respective courses of study. Even in these few counties the amount and value of the work given depends largely upon the inclination of the individual teacher. That is, while work is laid out extending through the grades, it is not usually made obligatory because so many teachers have not the right kind of training to make it profitable.

In the first place as we look over the courses of study, it is evident that while progressive teachers recognize the value of nature-study there has been no general state movement to produce a rational course of study. The various county superintendents and boards of education have worked independently of each other. With each election the attitude toward nature-study is likely to change. All depends upon the taste and training of the county superintendent. This it can be readily seen is wholly wrong, and tends toward the discouraging of effort upon the part of the individual teacher. I have in mind a county bordering upon San Francisco Bay which offers an excellent course of nature-

study throughout the elementary course, while stepping over the line into an adjoining county we find the whole matter ignored.

Nature-study is not yet understood by the great majority of even educated people. Two years since one of the leading daily papers in San Francisco ridiculed a bill introduced in the legislature which was intended to extend the teaching of nature-study in a more uniform and systematic manner through the State. The bill was defeated. What hinders most the spread of nature-study at the present time is, however, the lack of teachers who appreciate and understand what is wanted. Even in those counties where nature-study is supposed to be taught, comparatively few teachers attempt to do anything with the subject and fewer still go at it in the right way.

In past years several cities in the State have employed special teachers of nature-study, but as far as I know there is not a single city which does so at present.

Instruction in nature-study is given in each of the five normal schools, and this should in time have a marked influence upon the schools. It is found in actual practice, however, that this normal instruction often fails when the test comes. The young teacher knows the theoretical side of nature-study, but is not able to apply it, because of lack of actual contact with nature. We have yet to thoroughly appreciate the fact that it is the same with nature-study as it is with all those science branches which deal with phenomena, and that is, that knowledge which can be applied is gained only by going out into the presence of nature and there taking lessons.

The emphasis laid upon the teaching of agriculture during the last few years has resulted in the introduction of this phase of nature-study in many schools. The utility of the subject has appealed to many where the common pleas for the teaching of nature-study have failed to awaken any response. At least 17 counties in the State recommend the teaching of agriculture in the seventh and eighth grades. This is one step in the direction of a common basis for nature-study teaching; and if gone at in the right spirit must result in great good. I can not help but deprecate, however, a tendency toward the formal study of agriculture in the elementary school. We should not introduce specialized science at this period. Formal lessons from a text-book, no matter what the science, have no place below the high school. In

the elementary school the effort should be not so much to impart information as to inculcate a general interest in and familiarity with nature. Facts about the soil and what it produces and the relation of these to life is for the child only a part of the infinitely varied world phenomena about him. He does not distinguish and set by themselves the facts of agriculture any more than he does facts about the animals, or of physical phenomena.

Two years since a committee of educators after a discussion as to the place of physical science in the elementary school recommended that this subject be taught, but in an informal manner without a text-book in the hands of the pupils. This is another step in the right direction, but as yet seems to have borne little fruit. Each county superintendent lays out his course of study from his own personal viewpoint and as a result we find almost as many variations in the course of study as there are counties in the state. About 10 counties make some reference to the teaching of physical phenomena in the upper grammar grades, but no more than two or three outline any regular work. Experiments are recommended, but these are to be performed by the teacher after the manner of physics of years ago, instead of being developed from the interests and experiences of the pupils. The city of San Francisco makes no reference to the study of physical phenomena in its elementary-school course, while Los Angeles introduces a little work defined as "physics and chemistry" in the fifth grade.

We see, then, the pupils in nearly all the schools of the State passing out of the grammar grades with almost no introduction to the phenomena of the physical world about them. This is unfortunate for those who go no farther than the grammar school as well as for those who enter the high school. The first, embracing the larger number, never acquire the outlook upon their physical surroundings which they should have; and the second, from their lack of elementary training, find the science of the high school more difficult.

Nature-study as developed in this State, and in most others, is predominently organic; but except for the work in agriculture it exhibits little plan or system. It is given without any regard to the problems of geography with which it is in reality so closely bound up.

In the above criticisms upon the condition of nature-study teaching in the State of California it is not intended to convey the impression that the State is behind other States in its general school system, for it is not. In the adaptation of wide-awake and progressive methods its schools are in most ways at the front. Nature-study in its present development is everywhere subject in a greater or less degree to the defects pointed out above.

The true meaning of nature-study is not understood or its value everywhere appreciated. The vast majority of teachers feel their inability to teach the subject, often thinking, though wrongly, that scientific training is more important than a simple appreciation and love of nature.

While the work in nature-study in the various parts of a State like California, whose vast extent brings in such varied conditions, can not be made uniform in all parts, yet a common rational plan should lie behind it all. The laying out of the work should not be left to the individual counties, but should have some central authority behind it. The larger cities and counties can afford to employ special teachers of nature-study and the smaller counties should be grouped with an instructor for each group.

It seems more than likely from the present tendency that nature-study as a State movement will be agricultural in its main bearings. It is to be hoped, however, that this phase will not be emphasized at the expense of others. It should not be the aim of the elementary school to train the pupil in the elements of any particular science, even though it be one as important as agriculture. In the symmetrical development of the pupil, in his sympathetic introduction to the world of nature about him, elementary agriculture equally with the beginnings of the other sciences may justly claim attention.

Can we not develop here in California, where so much money is spent upon the schools, a more just appreciation of the relative values of the different studies, a more true understanding of the fundamental fact that education should deal less with books and more with real things? I believe we would then reap such a harvest of broadly intelligent men and women as would surprise even the most ardent supporters of nature-study, to say nothing of those who are at present indifferent or openly opposed.

NOTES

Edited by C. A. MATHEWSON

Instruction in Agriculture. Along the line of the note on page 93 of the March number of THE REVIEW, I might say that data furnished me by D. J. Crosby, based on questionnaires recently sent out by him, show that instruction in agriculture with experiments, school-gardens, etc., is given in nineteen states instead of twelve. It is mere text-book work in some of the normals in some of the above states, and also in others.

I have records of public high schools giving instruction in agriculture in 26 states instead of 17 as stated.

New York, April 20, 1908. C. H. ROBISON.

Edible Trees and Shrubs. Perhaps the most striking feature of the flora of the central portion of Australia is the large proportion of trees and shrubs which are edible. In the western districts of New South Wales, where the rainfall is meagre and subject to prolonged periods of dry weather, these trees and shrubs are of peculiar value. One of the most pronounced adaptations is the storage of plant food in tuberous-like structures. This food is drawn upon in dry years. Sheep have been kept alive for many months in this way. Cattle have fattened upon some of the best of these trees. They are practically useless for horses. Goats thrive upon them. Cows milk fairly well and produce good-flavored butter upon a tree diet. Working bullocks work hard when they can obtain nothing else. Camels prefer nothing better. Rabbits are far too fond of many of the best varieties, and have done much towards their annihilation. Such is regrettable, and if unchecked, these in conjunction with overstocking with sheep, must eventually alter the nature of the western flora for the worse. [*Agricultural Gazette N. S. W.*]

Wood Paving. The first attempts to pave streets with wood, three-quarters of a century ago, were failures, and for years after that no satisfactory progress was made. The blocks were round, which left large, unequal spaces between them. Their edges broke down and wore off, the wood rotted, and the pavement was soon uneven and rough, and, therefore, difficult to clean and unsanitary. At the present time, through the selection of suitable woods, cutting the blocks into rectangular shape so that their edges may lie close together, and treating them chemically to increase their durability, wood pavement is better in many respects than any other in common use. It is smooth, quiet, resilient, easily cleaned, and easily repaired. In wearing qualities it is superior to macadam, brick, or asphalt, and inferior only to granite and sandstone. In sanitary qualities it exceeds all but asphalt. [*U. S. Forest Service Circular 141.*]

Paper Birch. Practically every spool used for thread in this country is made from this species alone, and about 20 million feet board measure, are cut every year for this purpose. Insignificant as a spool may seem, its manufacture is by no means an easy task. From the tiny spools holding only 200 yards of thread, to the large, three-piece ones holding 12,000 yards, there is an almost innumerable variety of shapes and sizes. Yet each of these types must have every single spool belonging to it precisely

identical. In order that the thread may afterwards be wound upon the spools without difficulty, accuracy in manufacture is a prime requisite. This necessity has led to the invention of a number of very ingenious automatic machines which not only turn the spool with great accuracy, but also with great speed, some of them at a rate of a spool a second.

In order that all of the spools of a particular type may be absolutely uniform, the wood must be thoroughly seasoned before it is used and it must also be of some species which holds its shape after it has once been seasoned. Paper birch possesses this quality to a large degree, and this is one thing which adapts it so well to spool manufacture.

Still another industry which uses nothing but paper birch is that of the manufacture of shoe pegs and shoe shanks. These are used quite largely in this country in making the cheaper grades of shoes; they are also exported to quite an extent to foreign countries, principally to Germany and Japan. The industry does not consume so much wood as the spool industry, but it is nevertheless an important one and helps to make inroads into the forest.

The toothpick is still another article for which the paper birch is used almost exclusively. Perhaps it may seem to some that so small an article as the toothpick can not consume very much wood. In comparison with many other things, this is relatively true, of course; yet a single mill in Maine uses 2,000 cords of birch every year for this purpose alone. Quite recently important shipments of toothpicks to England, France and Germany have begun to be made.

Still another very interesting peculiarity of these industries, particularly of the three first mentioned, is that they not only confine themselves to paper birch, but that they are also limited almost entirely to a very small section of the country, Maine and eastern New Hampshire. Although paper birch is one of the few North American trees with a transcontinental range, being found from Newfoundland and Labrador on the east to Alaska on the west, it occurs in the United States only along the northern border, and is most abundant and most accessible in the extreme northeast. Maine, in particular, is the great paper-birch state, and here large tracts of it in almost pure stands are found. This is due to the fact that the birch readily takes possession of land that has been burnt over, and the great Miramichi fire in 1825, together with other similar fires of about that same period, gave it a chance to obtain quite a foothold there.

Unfortunately the paper birch is a short-lived tree and becomes red-hearted quite early in life, so that many of these stands are now overmature, and ought to be cut at once. The red heart is inferior wood and can not be used except for the cheapest grade of spools and novelties, so that these old stands are constantly decreasing in value. The birch near the railroads has also been very largely cut out and the lumbermen are having to go far back to get the necessary supply. In the case of these species, as well as practically all others in the country, the decreasing supply is beginning to make itself felt, and conservation in its use must be practiced if the woodworking industries now dependent upon it are to continue. [*Press Bulletin of U. S. Forest Service*]

THE
NATURE-STUDY REVIEW

DEVOTED TO ALL PHASES OF NATURE-STUDY IN SCHOOLS

VOL. 4 SEPTEMBER, 1908 NO. 6

THE NATURE-STUDY OUTLOOK

By L. H. BAILEY

[Abstract of introductory remarks made by Professor Bailey at the conference of the A. N. S. S., Cleveland, Ohio, July 3, 1908.]

Professor Bailey, President of the A. N. S. S., stated some points of his attitude toward nature-study. He considers the movement to be well under way and, therefore, not to need the kind of propaganda which it has been necessary to give to it in years past. It is not necessary to make any apology for nature-study, nor anydefense of it, although it is, of course, always needful to explain what it is, and also to discuss the methods that are to be employed. "For myself I read and ponder, and reply not. The movement is now so well under way that it does not need the approval of any person, nor does it depend on individual opinion. There are differences of view in regard to many of the methods. No one of us can say which of these methods is right. Perhaps all are right. Inasmuch as the work represents a fundamental attitude or point of view, it is necessarily larger and more far reaching than any body of opinion that may be current at any particular time."

The underlying motive of nature-study is to put one into touch and sympathy with his surrounding conditions. In order to do this, it takes hold of the things next at hand. It sees the important thing to do and does it. Its result is the enrichment of life.

It is very important that we do not place too much stress on mere subject-matter. It will be a mistake to make nature-study mere biology teaching. "I hope that the American Nature-Study Society will not become a natural history society. We are here to discuss not so much biological and other fact as to con-

sider the educational process." The effect on the child or the student should always remain the end and aim of nature-study work.

The schools at present seem to lack motive power. They do not train in leadership. They are largely static. They do not seem to be able to send pupils out to take hold of the first things. They do not seem to develop the desire or power to put pupils to work in city improvement societies, civic organizations, farmers' clubs, or other homely and common necessary work for the community. They are dominated very much by regularity and by system. They are also far too much dominated by colleges. The formal literary college entrance requirement is not an expression of the best activities of living. The nature-study motive which takes hold of the objects and affairs next to the individual and which develops spontaneousness, should have great influence in changing all this. Nature-study is merely a free, natural and direct educational process: various kinds of subject-matter are the means, but we must always be on guard that the means do not become the ends.

It is, of course, very important that all work in nature-study, as in anything else, should be accurate; but the end after all is not mere accuracy. We are so intent in some cases, I fear, on the importance of mere verbal accuracy that we develop in our students a depressing fear of making mistakes and the student is likely to lack starting-power. Nothing can be more deadening than mere insistence on accuracy in details. Of course the desirable thing is to have accuracy in all details at the same time that we develop point of view and the vigor of a personal initiative. We seem to be drifting into a kind of artistic idleness due, in part, to the change of modes of living, and to the fact that children are not brought up to the responsibility of work so much as they once were, and also to some of our educational methods; it should be the intent of all of us to overcome this growing tendency.

I have said on more than one occasion that the nature-study movement is an affair of the public schools. I am more and more convinced that the nature-study idea is very much needed in colleges. From a long experience I am convinced that a good deal of our college physics, botany, zoology and chemistry is very poorly taught if we are to consider its effect on the pupil; and this effect is, of course, the end of teaching. A pupil may

take college physics and yet have no idea of the common physical phenomena of life. He may take physiology and have little real conception of his bodily functions or of every-day sanitation. These subjects are likely to be taught with the special student in mind rather than the general student. The teacher is likely to think of the necessity of developing a whole subject rather than to give the student a rational and vivid conception of the subject as it relates to him. I have been interested all my life in plants; but I should not care to have one of my children devote four or five periods a week for a whole freshman year to the study of botany unless he were specially interested in botany. I am convinced that much of the beginning teaching in the sciences in colleges and universities is very bad. It is no doubt accurate, and it is also no doubt well adapted to the few students who desire to specialize in the subject; but such students should be taken further in courses designed for them.

There has been much criticism of the nature-study work because it is not "thorough"; that is, because it does not go far enough and deep enough. There is undoubtedly reason for such criticism. There are no doubt lax and lazy teachers, but it is not at all necessary to go into the long minutiæ of a subject in order to teach it thoroughly as far as we go. It is necessary to organize our nature-study work so that it will be systematic, definite and have relation. This is necessary if for no reason than that it may be adaptable to school method. Yet it is easy to make the work so formidable as to take the life out of it. We are likely to think because we have laboratories and teach by the laboratory method that we are thereby teaching nature-study. As a matter of fact, however, laboratory teaching may be just as far from life as book teaching is. It all depends on the intention and the mode. We are likely to feel that persons who are put through a form of training in any subject are thereby qualified to pass it. The fact, is, however that our colleges are turning out great numbers of uneducated persons.

It is apparent that there is a general dissatisfaction with the text-book method of instruction. Personal work with the object or the phenomenon itself is coming to be the accepted procedure. It is, of course, necessary to have text-books, but they must be written from the point of view of the particular grade or school in which they are to be used. A good part of our public school text-

books are now a reflection of the college text-book and this is likely to be a great misfortune. Even in the college realm many of the books are beyond the abilities and the experience of the student.

The practical question before the American Nature-Study Society is how to extend the nature-study idea and to establish it in a greater number of schools. While we are safely past the epoch of propaganda it is nevertheless incumbent on us to see that the nature-study spirit is kept before the public. If this society meets its full opportunity it will come to be the recognized expression of the nature-study idea. It is, therefore, important that this society be free from confusion of interests. It must proceed in singleness of purpose on a purely educational basis. It may also be necessary for the society, or some committee of the society to agree on some few subjects that can at first be offered to inexperienced teachers as concrete pieces of work that they may be able to undertake. Such recommendation should not be made for the purpose of limiting any one who is competent to handle nature-study topics, but only to suggest to those who are not yet quite sure of themselves, and to direct their efforts into the most productive channels. It is important that the nature-study work should be a popular work. It is very easy for societies to drift into merely technical discussions and to lose sight of the larger processes and ends. I think it would be a misfortune if the American Nature-Study Society should become an organization for technical discussion. It should be in the best sense popular, inasmuch as it is not the aim of the organization to expound the importance of any special line of information or subject-matter, but to set persons free.

THE TRAINING OF TEACHERS OF NATURE-STUDY

By JOHN WILKES SHEPHERD,
Head of Dept. of Science, Chicago Normal School

[A paper read at Cleveland conference of A. N. S. S., July 3, 1908.]

One's teaching of a subject bears the strong impress of his student work in that subject. This is particularly true of a beginning teacher both as to subject-matter and method of handling it. It is a well-known fact, for example, that a beginning teacher of science in a secondary school selects material for his classes from that which he has studied and presents it in much the same way as he had it presented to him in college. This may be responsible for the fact that a large part of the science work in our secondary schools seems to be diluted or elementary college science, and it too often happens that the diluting degenerates into an almost useless taxation of memory under the guise of proof or generalization from laboratory work. In general, too much of our science work lacks the vital touch to produce initiative in its students. Is it not true that much of our laboratory work, which we consider essential to even an appreciation of science, is of the same mental quality as that of the individual in the industrial world who does what he does because he is told to do it? How many students of science go into the laboratory because they are told to go, instead of going in to solve some problem which is their own!

If science work in the secondary school has been largely diluted college science, what kind of work should we expect in the elementary school from the foster child, or perhaps lineal descendant of science, namely, nature-study? The answer is to be found in the early nature-study—diluted secondary-school science. The early efforts in nature-study were made by science teachers, mainly biologists, and it is not to be wondered at, therefore, that the work was an attempt at very elementary science, or at least pointed toward science. It is an easy matter to trace the parallel between science and nature-study, both as to subject-matter and method of treatment. When science work was largely demonstration by the teacher, supplemented by reading, nature-

study was chiefly a matter of demonstration by the teacher, with occasional readings. And later when science insisted on each student being provided with individual specimens or apparatus, nature-study made similar demands. When biology emphasized morphology, nature-study required the same. So much for the nature-study of the past, whose chief end was to furnish advantages to those of the children who at a later time took up the study of science. Such form of study was useful in its time, but is not in keeping with the present views of education.

It is now rather generally conceded that nature-study is not science—that in science the teacher holds close to fundamental principles or laws, but that in nature-study she moves over and stands among the children. The perspective, the point of view, is different. Nature-study is not interested in developing broad generalities, but in furnishing the children with rich, vital experiences. And here I may say that I believe this can be done best by furnishing these experiences through the stimuli of problems —the children's problems, and this will make the work vital and full of human interest. To illustrate, I know a teacher who had a class of city children and concluded to furnish them with some simple experiences in the application of current electricity. Through her tact, the children decided to install a small electric light in the cloak room. In reaching this decision the initiative passed from the teacher to the class,—the problem and its solution were the children's and the results most gratifying.

What, then, should be the training of one who is to furnish situations out of which problems grow whose solution is with material,—what should be the training of a teacher of nature-study? Furnish the candidate with student experiences similar to those the children are to have, that is, the prospective teacher in nature-study should have experiences with material, the experiences superinduced by problems of her own. Furthermore, the student teacher should have an opportunity to work out her own problem according to her own plan. For example, I knew a class of student-teachers at one time interested in the determination of the relative conductivity of different solutions. In making the determination they wanted a current of 6–8 volts. Their immediate problem was how to get the current. It was their problem and they solved it according to their own plans The teacher of the class saw to it that their schemes were workable.

but otherwise kept hands off. At the conclusion of the work five different kinds of cells or batteries had been made and each student had contributed one cell. A sufficient amount of this kind of work would develop the method of handling nature-study material with children and now I should like to say something as to the specific material handled. I think it is very desirable that the student-teacher have experiences as a student with the same kind or class of material that the children in nature study will use. For example, if the children are to grow plants, then the student-teacher should have experience in plant growing; and if the children are to have experiences in making cells for current electricity then the student-teacher should be acquainted with cell making. At this point I wish to make my position plain. I do not advocate the student-teacher doing the *same* work as the children in nature-study,—it would not be possible and if she undertook it she would not be working on her plane as a student, but her effort would degenerate into a poor quality of imitation, a stagnant, deadening procedure. Secondly I do not advocate the student-teacher working with *all* the material that the children may use in nature-study, for under such conditions one could not suggest a connected, unified course such as would conform to the habit of thought of the mature student. I should want the student-teacher to solve problems with material in the general field of my nature-study course and would then rely on the germinating influence of this work to help in the student-teacher's subsequent handling of her nature-study class.

When the student-teacher has had all the academic preparation of the kind indicated that her course will permit she still lacks another very important part of her training, namely, an opportunity to apply her student attitude as a teacher under the guidance of those who appreciate her point of view. She has worked as a student on a problem of her own and as a teacher it remains for her to have the children work on problems that are theirs and this transition is not easily and quickly made. The student-teacher should have an opportunity to teach a class of children in nature-study so as to get training in the teaching attitude. One of the most efficient helps in this phase of the work that I know is part of a general scheme in the Chicago Normal School. When a student-teacher is teaching in any subject, she together with all others teaching the same subject meet twice

a week in a class called special method. According to this scheme then, all the students teaching nature-study meet twice a week on common ground with a common, specific purpose; and the discussions are always lively and permeated by every-day teaching experiences. All the teacher of special method needs to do is to guide the discussion, for more than an ample supply of material for discussion is furnished by the class. As a result of experience, I have come to the conclusion that any particular course of nature-study should receive but slight consideration in such class; also, that the main lines of all the work should thread their way back to the great fundamental, namely, an opportunity for children to have vital experiences with common things, under the influence of problems to them. The problem aspect of the experience is important; it is the chief vitalizing element of the children's work.

TRAINING TEACHERS FOR NATURE-STUDY

By O. P. DELLINGER
Winona Normal, Winona Lake, Ind.

[Read at Cleveland Conference of A. N. S. S., July 3, 1908.]

The best training to make a good nature-study teacher is, of course, different from that needed to produce a good botanist or zoologist. Courses in agriculture which may be good for men who are to superintend farms are of little value to teachers who are to plan nature-study courses. The man who is best qualified by training will come out ahead in the end but he must be trained in his chosen profession, not in the profession of another. Just here is where the difficulty lies. Colleges and normal schools have courses planned in botany, zoology, and agriculture and they do not like to add to these, courses in nature-study. The result is that teachers are forced into courses which are planned to train botanists, zoologists or farmers, not teachers of nature-study. A few may be able to adapt what they get from these courses to their needs but the majority find themselves hopelessly confused and are never able to use satisfactorily the knowledge or training they received.

This being the case, it is immensely important that courses planned for teachers of nature-study be offered in training schools for teachers. These courses need to be fairly complete within

themselves. If nature-study is to receive universal respect and approval among educators and teachers it must have a character of its own. It can have this character only when it becomes divorced from the subjects so nearly related to it and stands out with its own aims, purposes, and materials.

Teachers who take the work in nature-study should feel the same confidence in their ability to plan a course for this subject that they feel in the older and better established ones. To give them this confidence the nature-study course should do the following things:

First, it should indicate the nature of the materials. Teachers need some standard by which to determine what is nature-study and what is not. Until they have this standard they will never take up the subject. Many good teachers have failed when they attempted to teach nature-study because they had no basis for selection. They had somewhere received the impression that any common object, just any thing, would do. Such teachers know from experience that other qualifications need to be added. Of course the materials for one community will be different from those for another and they must be different for country and city. Yet the teacher who has selected materials for one place has received a training that will help him wherever he goes. He has the habit of selection.

Second, it should make clear the purpose and aim of nature-study which sets it off from other related subjects. It is very essential that the teacher get early in the course some definite point of view. Many teachers have enough knowledge of the materials to be used if they only had some point of view around which to organize them. Bailey and Hodge, the leaders of the nature-study movement in this country, agree that the purpose of nature-study is to teach those things in nature which best adapt the individual to live in "effective harmony with his environment." That people are out of harmony with their environment is shown by the prevalence of unkept and unbeautified homes, the enormous leaks in our natural resources, the ravages of disease, the flow of the country people into the city, and the ever increasing artificiality in our city life. If the teacher understands the purpose of nature-study as stated above he will have no hesitation in rejecting much of the material advocated today for nature-study.

Third, it should acquaint the teacher with the literature of the subject. There is so much bad nature-study literature mixed up with the good that the teacher is often unable to make any selection. Of the many texts on nature-study few are of value. The others should be avoided except where they are used as bad examples.

Fourth, it should give a few type outlines. Some object should be studied as it is expected that it be studied in the grades. Enough of this work needs to be done to make the teacher feel somewhat at home in the subject.

Fifth, it should stratify the work for the different grades. There is no other need more urgent. The repeating of the same lessons on the same animals or plants in each successive grade is not conducive to the best results. There is enough material for all grades and some to spare to the high school and college, but it needs to be graded and arranged.

Whenever the course becomes as definite as the courses offered in other subjects, nature-study will cease to be twaddle and take its rightful place in the curriculum.

TRAINING OF TEACHERS OF NATURE-STUDY

By MAURICE A. BIGELOW
Teachers College, Columbia University

[A paper read at the conference of the A. N. S. S., Cleveland, Ohio, June 3, 1908.]

For a dozen years or more the leaders of nature-study in America have been answering criticisms by the claim that with properly prepared teachers nature-study will always be a decided success. On the other hand, some of those who are engaged in training teachers for school work defend their own failure in preparing teachers on the ground that they are very uncertain as to the kind of training needed for nature-study teaching, because there has been so little agreement regarding what nature-study is or should be.

It is obvious that for the A. N. S. S. there is a three-fold work: (1) in securing more general agreement and understanding of nature-study ideals, principles, methods and materials; (2) in determining how teachers of nature-study should be prepared; and (3) in working for increased attention to nature-study by those who are in charge of training schools for teachers.

The subject of this conference today, as announced in the official journal of this Society, is the training of teachers of nature-study and elementary-school science. I take it that that last phrase, "elementary-school science," was tacked on in order to catch the attention of that almost extinct species of science teacher who fails to understand by nature-study anything more than some simple observations of plants and animals by children of the primary school, everything else being "science." Fortunately we have almost forgotten that narrow interpretation of nature-study and the A. N. S. S., true to the broad working definition involved in the first section of the constitution, stands for nature-study dealing with any phase of nature which touches every-day life closely enough to justify attention in elementary education.

I understand, then, that in the discussions of this Society we are using the term nature-study as a convenient general designation for all elementary-school studies of any objects or processes in nature which deserve attention in elementary schools, and I am not forgetting that even the human body is a part of nature. It is obvious, then, that in considering nature-study, and especially the preparation of teachers of the subject, we must keep in mind the fact that nature-study may in its subject-matter have close relations to what, in higher schools, we classify as biology, physics and chemistry, geography, physiology and agriculture.

I have already pointed to the fact that a great work to be done by this Society is the determining of what is the best nature-study. It may be urged that until this is done, and well done, we can make little real progress in the training of teachers. My answer to this is that already we have reached great *agreement on the most vital problems*, the fundamentals; and now we need teachers trained in the light which we now have, in order that, true to the scientific instincts, we may subject our present-day hypotheses to careful critical experimentation, and thus slowly but surely build upward the superstructure of nature studies on the foundations of principles well laid today. We have agreed that nature-study should not be limited to any particular phase of nature-study, that it should deal with the common things of nature, that direct observational study is the essential method, that the study should be made from the standpoint of nature as it touches our daily lives directly, and that close imitation of the technical

science of higher schools is highly undesirable for nature-study in elementary schools. Such agreement on fundamental principles ought to justify greatly increased activity in giving special preparation to teachers of nature-study. We need not wait for this Society to work out the details of the best nature-study before beginning to train teachers. In fact most of the details will be best worked out by the teachers at work after we get them trained.

Time limitations compel me to review hastily several methods suggested for training nature-study teachers:

1. College-extension lectures: The college professor (999 times in 1000 the professor of biology) accepts an invitation to give a short series of lectures before a teachers' institute or a teachers' club. Packing up his most gorgeous lantern slides, the professor goes forth to teach the teachers of a town or country how to admire the beauties of birds and trees and flowers. You know the result. The audience probably is enthusiastic, especially if the lantern slides are good and the speaker has a good assortment of nature stories; but one who looks afterward for results is convinced that extension lectures will not transform the vast majority of teachers into good teachers of nature-study. I am not opposing the university extension lectures on nature-study. They are valuable for inspiration, not to mention harmless entertainment; but we must not expect to solve nature-study problems with teachers who begin and finish their own studies of nature in a limited series of lantern-slide lectures. We must have something which gets nearer to natural things themselves.

2. The nature-study supervisor: A few years ago there was a great demand for supervisors. Principals and superintendents seemed to think that a year's work by a supervisor ought to solve the problem for all time. The plan might have given better satisfaction if there were more permanence of teachers; but it is nonsense to think that once started by a supervisor, nature-study will go on like a perpetual-motion machine. Moreover, it is not reasonable to expect that busy teachers who never spent an hour studying science can be supervised into good nature-study workers by occasional visits and suggestions from a supervisor. Supervisors are needed, not for one year but regularly; but the best of supervisors can never solve the problem of training teachers of nature-study so long as the rank and file of teachers do not

get good nature-study and science in their preparation for teaching. The supervisory system has done great harm because so many school officials have failed to see that they were attempting the impossible and that failure of a supervisor does not mean failure of nature-study.

3. Training by colleges: All colleges give technical science courses; but experience shows that these alone are not adequate for training teachers of nature-study. The college science does not give the proper point of view and knowledge of needs of elementary schools. Of course this is not necessarily so; I am simply stating facts easily observed in most colleges today. In fact, in very few colleges do the science courses give adequate preparation for even high-school teaching, and elementary schools are still more distant from the colleges. But changes are coming rapidly. Many college teachers of science are beginning to recognize that introductory science courses in colleges should deal with those facts and great ideas which appeal most to the man who can take but one course in any one science. We are certainly coming to an age when the first college course in zoology will not omit half the great groups of animals and the first course in physics forget to mention light and electricity, because the professors want to reserve these topics for advanced courses. Introductory science from the viewpoint of liberal, not technical education, is the demand of the hour; and the final result will be courses which approach much nearer the nature-study point of view. Such improved science courses, added to the courses in education now being introduced into colleges, will go far towards making the average college graduates of science sane and useful workers in elementary-school nature-study and in high-school science.

4. Fourth and finally, and most important, normal-school training: All that has been said concerning college training can be applied legitimately to many normal schools, because their science departments copy closely the ordinary undergraduate college courses and forget (or have never learned) that normal schools are intended to train teachers for public schools. It is true that a few of the better normal schools are now working hard at nature-study problems. Some of them offer technical science courses, in order to give students the subject-matter; and then in a pedagogical course, select and adapt the materials to nature-

study teaching. At present this seems to be the most hopeful plan, for the reason that it is unsatisfactory to give introduction to all the various phases of subject-matter in one course. Moreover, students need for their general education some knowledge of biology, physics, chemistry and geography; and should get part of these in the high school. Hence, all things considered, it seems necessary to make the nature-study course of the training school a pedagogical course which will work over materials gained from science courses and adapt them for nature-study teaching. So far as permanent advance is concerned, we can have little faith in an isolated nature-study course for teachers which tries to give knowledge of subject-matter and of method needed by a teacher in elementary schools.

In conclusion, it is evident that the future of nature-study teaching rests with the normal schools which will directly prepare the teachers. Therefore it is of the utmost importance that the A. N. S. S. should take every opportunity to encourage and improve preparation of teachers of nature-study in normal schools. That there is a great field for development here is shown by the fact that the large majority of the State normals, and the majority of the city, county and private normals in the United States, are making no effort at training teachers of nature-study; and in most cases these institutions have no members of their staffs interested in the nature-study movement.

TRAINING TEACHERS: ABSTRACTS OF DISCUSSIONS

[EDITOR'S NOTE. In addition to the speakers represented by the following abstracts, several others are not recorded because the secretary has not received abstracts in time for this issue of THE REVIEW.]

I

By STANLEY COULTER
Purdue University

I have been extremely interested in what has been said this afternoon, both in the opening address of Professor Bailey and in the papers concerning the preparation of teachers in nature-study. As regards the valuable suggestion of Professor Bailey, that in order to meet the existing school conditions the subject must be standardized to a certain extent as to materials, method and purpose, I have something to say. It is evident from what has been said that standardization cannot be effected along the lines of materials, for we have been told these materials embrace plants and animals, the phenomena of physics and chemistry, the industries and a host of other things. It is evident to me that the standardization, if possible at all, is possible only along pedagogical lines. The gradation of our schools suggests the possibility of developing in an orderly and natural way very definite intellectual powers. In the early years of school-life the purpose in view might well be a development of the power of seeing things clearly and sharply, and for the development of this power every school environment furnishes abundant material. In the selection of the material utilized, care should be taken to choose that most closely related to the daily life of the child and therefore the most vitally interesting. Later the purpose might lead by a continued perception of familiar objects up to the power of compelling each object or phenomenon to reveal itself in its completeness. Then we would have the relationship of objects or phenomena to each other, the relationship of objects to their surroundings, the adaptation of parts to the function they perform; and running through all and vitalizing all, the economic relations. With such purposes in mind, purposes adapted to the developmental stage of the child, the wealth of material is greatly increased, the points

of contact with nature multiplied and the life of both pupil and teacher wonderfully enriched. All of this means, as I said in Chicago last winter, that the teacher must realize and realize definitely, that nature-study is not a body of knowledge, but an attitude of mind. This cannot be repeated too often nor emphasized too strongly. Nature-study is not a body of knowledge, it is a new view-point; a new view of natural objects and phenomena, a new view of the environment and growing out of this a new view of the meaning and significance of life.

Concerning the preparation of the teacher, I have not much to say. I am inclined to the opinion that the teachers are much better prepared than superintendents and the officials directing school affairs. The madness for uniformity is so widespread and has become so firmly fixed in our school systems that originality, initiative, enthusiasm, are not merely suppressed, they are actually anathema maranatha. The results of this craze for uniformity are obvious and would be ludicrous were they not so infinitely pitiable. Nature-study is really revolutionary. It has been and still is a groping, somewhat blindly indeed, after some device by which education can be brought into touch with the daily life of the child; to make it so attractive, so vital, that he goes to the school as naturally as he goes to his play or to his rest, since it, too, is a part of his daily life. Professor Bailey told us a moment ago of his belief, that in the near future our school system would be *redirected*. This new viewpoint, that education must be related to the daily life is the redirecting force and is nothing short of revolutionary. Of course a thorough training in elementary botany and zoology and chemistry and physics and a whole line of other subjects is extremely valuable, since it gives a splendid back ground of knowledge; but of infinitely more importance is the possession of a quick eye, a sympathetic heart and an honest purpose. With these and with the wealth of material surrounding every school the real teacher cannot go far astray. In teachers of the other sort, I have no interest; the law of the survival of the fittest will surely operate and those who teach the schools of the future will be those of sympathetic heart and honest purpose, who have grasped the conception that the school and life are one and the same thing. The really important matter is, that we as teachers should recognize the fact that there is such a thing as a new education in which the supreme problem is the

symmetrical development of the child, and that in that education much of the pedagogical material will naturally be found in the environment.

II

By LETTA BERNICE BURNS
Jamaica [N. Y.] Normal and Training School

First, careful attention should be given to the difference in the needs of city and country schools. The point of view of the city child is widely different from that of the country child, but it is as necessary that he have a knowledge of real things in order that he may read and understand things of every-day life. More material is needed in city schools.

Second, that the instruction given in nature-study be of a practical kind as well as asthetic. Pupils need a better understanding of the agricultural interests of the country, forestry, gardening and other phases of work related to nature-study. Too frequently the meaning is in *words* only and not in actual contact with the real things.

Third, the time given to the training of teachers for nature-study work is too brief in most normal and training schools. The work of the city and village teacher requires careful preparation. They must know and be able to handle the problems found in the environment of the child.

III

By FRED L. CHARLES
De Kalb [Ill.] Normal School

Few situations are more highly artificial than the atmosphere of many schoolrooms. Nature-study, by taking the child where it finds him—akin to the creatures of the wild, immersed in the natural world, the world of things—gains a foothold at once upon his interests and his emotions.

If the teacher can stay young, keep the child attitude, listen to stars and birds with open heart, she is fit for the calling of nature-study; at least, if she cannot do these things, she is unfit. But there's the rub—to take the book-tutored graduate of today and restore his heritage of contact with and enthusiasm for the wonders of the commonplace. Eugene Field puts it well in his poem

"Long Ago," when, after telling of his boyhood intimacy with birds, flowers, woodchucks, toads and bees, he says:

"And pining for the joys of youth,
I tread the old familiar spot
Only to learn this solemn truth:
I have forgotten, am forgot.
Yet here's this youngster at my knee
Knows all the things I used to know;
To think I once was wise as he—
But that was very long ago."

In the primary grades the æsthetic is legitimately prominent and can be presented by a teacher without much preparation or acquaintance with the material. However, this same æsthetic becomes anæsthetic when given in repeated annual doses. There must be meat in the lesson if the fourth grade boy is to give his approval to the exercise.

The work, ordinarily, should be thrown into the form of the problem; hence the point of attack—of contact with the pupil's experience—becomes a matter of strategic importance.

All this means that the best preparation of teachers of nature-study involves a groundwork of scientific training, not merely for the mastery of subject-matter, but also for the appreciation of scientific method and the peculiar functions of science instruction.

It means also that there must be a course of study—not one course for all communities, but some form of insurance that deadly repetition will be avoided and that the expanding interests and needs of the child will be pedagogically respected.

IV

By GILBERT H TRAFTON
Passaic, N. J.

When I first became interested in the nature-study movement, one of the earliest conclusions at which I arrived was that the solution of the problems lay in the normal schools in the preparation of the teachers. Subsequent experience has strengthened this conviction. This Society will probably not discuss any subject within the next decade so far reaching and significant as the one before us this afternoon.

I would like to discuss this subject from the standpoint of the teacher. My experience as supervisor of nature-study in a small city has given opportunity to see what preparation teachers have

received for teaching nature-study, to ascertain what preparation they need and to appreciate the teachers' standpoint. There are many problems which can be solved only by the teacher in the schoolroom; and a very important field for this society lies in securing the cooperation of grade teachers through the local sections of the Society.

Several years ago a few data were secured from the teachers of Passaic, representing 21 normal schools located in six States. The following questions were sent to the teachers, with results as appended after each question:

1. What are the chief difficulties you encounter in teaching nature-study? Answers: Securing material, 37 per cent.; lack of knowledge of the subject-matter 30 per cent.; lack of time 18 per cent.

Difficulty in securing material may have been due to two causes, unfavorable location, or ignorance on the part of the teacher relative to the habitat of the material. As a matter of fact the second was one of the chief reasons, suggesting the need of field work in the teachers' preparation.

2. What do you think should have been the nature of your preparation in the normal school? Answers: A line of work to develop the teacher's power of observation, 47 per cent; field lessons, 33 per cent.; model lessons, 20 per cent.

My experience with the teachers furnishes abundant evidence that they feel the need of a keener power of observation so that they may first traverse the path over which they wish to lead their children.

3. What do you feel to be your greatest present need? Answers: Model lessons, 41 per cent.; more knowledge of subject-matter, 14 per cent.; assistance in securing material, 11 per cent.

The first item referred to suggests one of the greatest needs of teachers today, that is, training in method in the normal schools. A teacher can not he expected to handle successfully so difficult a subject as nature-study unless she has had very definite suggestions relative to methods of teaching it, and actual practice in the training school. Herein lies one of the chief opportunities for the normal schools to prepare our teachers to render more efficient service. The teacher who is truly interested in nature-study will eventually evolve successful methods of her own initiative; but

the great majority of teachers will not do so, nor can they be expected to, without special instruction in the subject.

A few months ago there was published in *School Science and Mathematics* a symposium on the work being done in biology and nature-study in some of our normal schools. This suggested that it might be instructive to ascertain the opinion of experienced teachers regarding the kind of work which they thought should be done in this connection. The following questions were sent to about 125 teachers of Passaic, representing as previously explained, various States and normal schools. "As a result of your experience in teaching, what kind of preparation in your normal school course do you consider would have been most helpful to you for the purpose of teaching nature-study. (1) Courses in botany and zoology separately or one course in biology taking the study of plants and animals together. (2) A course in which plants and animals are taken up in accordance with the seasons, or one in which they are studied in the order of their complexity, beginning with the simplest and proceeding to the higher forms? (3) A course in systematic biology, or one in nature-study, following somewhat the lines of the course you would be expected to teach in the grades?"

Following are the results: Biology, 63 per cent.; botany and zoology separate, 37 per cent.; order of seasons, 62 per cent.; order of complexity, 38 per cent.; nature-study, 82 per cent.; systematic biology, 18 per cent.

In conclusion the following summary may briefly state my opinion in this matter: The nature of the preparation which my experience with teachers indicates would be most serviceable to them in teaching nature-study, and the kind which I think the teachers themselves feel that they need most, is a course in biology or nature-study, if one may choose to call it so, in which plants and animals are studied together in accordance with nature's classification by seasons and in which the teacher is taken over somewhat the same ground that she is expected later to lead her pupils. In connection with this there should be constant suggestions regarding the question of method to be employed in the schoolroom, and there should be practice in the training school. If in addition to this, the time allotted allows a broader and more extended survey of the field, the efficiency of the preparation will be increased; but these other features seem

to me to be the first essentials in the training of teachers of nature-study.

V

By J. W. SHEPHERD,
Chicago Normal School

It has been suggested a number of times this afternoon that there should be at least a general nature-study course outlined, and on this point I should like to say that in such event there should be at least two, one for rural schools and another for the schools of cities. Nearly all our efforts in nature-study have been with things common to the environment of the country boys and girls, and in an effort to teach nature-study along these lines the city teacher has felt obliged to furnish the material for the children, often at tremendous expenditure of time and energy, or else allow the work to drift into a mere talk-fest. The experiences of country children are different from those of city children, but I do not see that within themselves these experiences are necessarily better from an educational standpoint. Therefore, I think that if city children should work with the environment of country children it would be equally well for the country boy and girl to be furnished with the experiences of the city. My point is that country children should work with the actual and possible things of their environment, and that city children should work with different things, in conformity with *their* environment.

Another point I wish to make is that nature-study has fallen heir to a term that is unfortunate. I mean the word "observation," which it seems has become too narrow to comprehend the spirit of nature-study. It is not sufficiently dynamic, and permits of too little initiative on the part of the children. I would suggest the substitution of the word *experience*, which comprehends observation, and more. An incident that happened in my nature-study special method class this spring will make the point clear. One student-teacher said she wished to take her nature-study class out to observe the difference between the leafing of two trees in the school neighborhood. Another student-teacher suggested that a much better plan would be to have the children find out which of the two trees furnished the more shade, and why. There is a vast difference in educational value between these two plans. The initiative in the first is at least very largely with the teacher and the class might be quietly receptive, but in the second

the initiative is with the children and would result in vitalized experiences which comprehend the observations of the first, and much more.

VI

By J. DEARNESS, M. A.
Normal School, London, Canada

I wish to emphasize the objection taken by a previous speaker to the term "*observation.*" It tends to contract the aim of the subject to mere looking and naming. Instead, however, of the proposed richer term *experience* I should prefer *investigation.* Nature-study is self-activity on the part of the child to discover something that it desires to know—doing something to find out something. On the teacher's side it is leading the child into full possession of all his powers to react on his environment to the end of efficiency and happiness. Learning facts about natural objects, even facts that adults think worth knowing, may have extremely little educational value. The teacher who forces his adult interests in scale insects and wheat-rusts for example, upon the child is liable to miss completely the nature-study value, whereas a scientific toy which a child had brought to school to amuse his companions with may be made the subject of a fruitful and genuinely educative nature-study lesson. Seek first among the children's daily experiences for subjects for nature-studies and then treat these by the heuristic method.

VII

By HORACE H. CUMMINGS
Salt Lake City

In view of the fact, brought out by previous speakers, that pupils in large cities have so little experience with plants and animals, it is a great mistake to confine their nature work to biology. Physics should form the basis of one-third of this work, as they are at all times in touch with one or more of its laws. Gravity, light, heat, sound, electricity, the pressure of gases and liquids, friction, capillarity and a hundred other phases of this science have been observed by city children all their lives; and these observations should be systematized and interpreted by them.

A unifying and guiding element in arranging any course in nature-study must be the home experience of the pupils. Lessons in the first grade should be based upon the things seen and experienced in the home—the house, its rooms, furniture, uses; pets and domestic animals; window and garden plants; toys and games; and such occupations as cooking, washing, etc. For study of succeeding years, follow the child's expanding mind from the home activities and supplies to the store, the farm, the factory the mine, the forest, and other sources of supply, the ways of transportation and the laws of nature are manifest in all these things. In short, the child's physical and mental environment in his various stages of growth furnish a natural and abundant supply of topics for nature lessons so that no lesson needs to be repeated. New and interesting material is found in greatest quantity in each grade and if presented aright will keep the pupil in intelligent harmony with his environment at each step in his development.

The Training School of the Utah State Normal School has developed a correlated course of study based on this principle, including other branches than nature-study, and the results are highly satisfactory.

VIII

By ALICE JEAN PATTERSON
Normal, Illinois

I wish to add a word to what has already been said regarding nature-study in its relation to children. To me a recognition of this principle is of vital importance. We must meet the children on their own ground if we make nature-study a real force in education. We must make an effort to fit the needs of the children at every stage in their development, both as regards selection of material and methods of presentation. We must bear in mind that children, especially little children, gain most of their ideas by motion activity. Nature-study gives ample opportunity to exercise the muscular activity; no other subject is better adapted to train hand and mind and heart at the same time.

In regard to training teachers for this subject, one difficulty we have encountered is getting teachers to realize that nature-study can not be treated in the same way as other subjects. What they wish to do is to plan and teach formal lessons which are complete units bound together, tied up and put away once for all. They

are afraid of leaving dangling threads, afraid of unsolved problems. It is hard to have them realize that problem solving is the very life of nature-study, that it does not matter how long it takes to solve a problem so long as the children are intelligently investigating and earnestly working.

A word about physics and chemistry as nature-study material: I fully agree with some of the speakers that plants and animals must constitute the bulk of our nature-study material. Nevertheless, I do not agree that these should be studied exclusively, or that they touch the lives of the children more closely than material gathered from the field of physics and chemistry. What could touch the lives more closely than the heating, lighting and ventilation of the home, water supply, and weather phenomena? We have found nothing that has been worked out with more interest and profit on the part of the children than the simple principles underlying the working of the every-day appliances of the home.

IX

By DORA HARGITT
Hamilton, Ohio

It has been said that "nature-study is not botany, is not entomology, is not ornithology, it is none of the 'ologies,' is not science." I think, however, that for the teacher it is all these and more; so let us have the course for her preparation made as heavy and full as possible. But for the child in the school let us have as little formality as possible in the study of nature. Rather let us as far as possible send the child into the fields to see for himself and then to return to report what he has seen of interest. Thus we may arouse "the seeing eye, the hearing ear and the feeling heart" of the child and make him a better moral and intellectual being.

COLLEGE BIOLOGY IN RELATION TO TRAINING OF TEACHERS

By C. F. HODGE, Clark University

[Editor's Note.—This paper by Professor Hodge was prepared for the Cleveland conference, but did not reach the secretary of the A. N. S. S. in time to be read at the meeting.]

The greatest present need in biological instruction is a common-sense stratification of matter and method for the different strata of our educational system. A plan must be worked out which shall command the assent of teachers of every grade from kindergarten to university, and which shall unify, organize and correlate biological instruction through the entire course. This alone can bring order out of present confusion and give us a course of instruction which shall be consecutive, vital and adequate for the needs of intelligent citizenship. This task can only be accomplished by the united effort of teachers of all grades working on absolutely even footing, trying experiments and comparing results. In work like this there is no high or low; or if there be, in point of number of lives affected and hence in vital importance to the people as a whole, the instruction in the common schools is highest, not that of even the university should take first rank. Sir Wm. Macdonald's dictum, "If scientific education is good for anything, the younger the better," holds true; for if we give it adequately to the fountain head of our education, our universities shall not lack for spirit or men to push forward the advance of science.

Shall college biology continue to be a culture for and of itself alone and without regard for the strata of public instruction below it? This is the central question, and concerns the chief source of present confusion.

I can do little more in this brief note than give the bare conclusions of several years' study, and even these are in process of taking form and are subject to change without notice as good reasons for change are advanced in course of the discussion.

Colleges have been, and are more and more, giving high-school teachers of biology their professional fitting. I think I ought to

say "*misfitting*." In consequence the grave mistake has been made of trying to force technical biology, or zoology and botany, which is much worse—which may not be so bad for college strata—down into the high schools. This course is sheer waste of time for pupils who do not go on into college and a good deal worse for those who do.

Confusion worse confounded arises when college students of biology go to teach in normal schools. Then the children in the grades get college biology three removes out of its proper place. It would be far better if biology teachers in our normal schools be drawn from graduates of our agricultural colleges, or from the ranks of intelligent gardeners and horticulturists, than from those who have had the present biology course in many colleges, and have been given no hint that it is not and cannot be "*adapted*" to the needs of normal-school students and grade pupils. If the colleges are to train normal-school teachers in biology, it is imperative that they supplement their present technical courses by a thorough-going course in biological nature-study. That is, there are a few things of vital import to the life of the child and the home which his instructors must be able to teach. There are innumerable other things—technical botany and zoology, among the number—which are of no present importance to child or home, to teach which is not only waste of time but often a positive injury.

There are also a few things that every decent member of a community ought to know about the forces of living nature. Every individual ought to learn—and the community has the right to demand that he be taught and that he does learn—the things of vital import to community life, before he assumes the functions of citizenship. Here, then, is the legitimate field of high-school biology at the threshold of active citizenship. These vital matters are the interdependences of living things with special reference to human health, life, and other interests. Technical botany or zoology as commonly taught have little relation to these fundamental community interests.

Health, individual and civic, is the paramount interest, a pound of which outweighs a ton of mere scientific information. Cannot colleges give courses in hygiene and bacteriology which shall enable their graduates to teach high-school pupils to keep themselves healthy and be more efficient in checking the spread

of contagious diseases? If they are to prepare high-school teachers, is it not the duty of the college to do this? How better could the great movement for American Health be effectually advanced?

Conservation of natural resources, next, presents the largest civic problems, in the solution of which every intelligent citizen must bear a part. This on the side of biological resources should be understood to include not only conservation of forests with the holding of soils and storing of water, but conservation of native animals and plant species of mammals, birds, and fishes, even to conservation of natural beauties of landscape and native plants on account of purely æsthetic values. The way we have devastated forests and exterminated valuable species is a national disgrace and a crime against future generations. Forces and motives of waste and destruction must be speedily reversed toward general conservation, and this can only be done by adequate education. Problems in this field may be illustrated as follows:

Seasons of flowering and ripening seeds in about 40 of our most important forest, nut and ornamental trees; together with methods of saving storing and planting the seeds and rearing the trees.

Function of forestry in controlling water flow and washing of soil.

Outlawed weeds and poisonous plants.

Native plants in danger of extermination.

Common ferns.

Elementary agriculture and horticulture.

Common mushrooms, edible and poisonous.

Common parasitic fungi, blights, smuts, rusts, mildews, locally important forms.

Insects, life-histories and natural enemies of about 151 most important species.

Economic status and foods of about 100 birds.

Common amphibia, natural history and value as destroyers of insects.

Important fresh-water fishes, food, spawning seasons and habitats.

The above is not put forward as a complete statement and it is not intended that this entire body of knowledge shall be taught during a possible one year's course in the high school. Much of it must be taught in the nature-study of the grades. The high-school course could finish out and especially give the civic and national bearings and points of view.

The college may do: (1) *Nothing*, and withdraw still further from the main currents of American life. (2) Prepare its

students to teach; by modifying present biological courses or by putting in coordinate courses specially designed to fit teachers for normal, and high schools. The present tendency toward the latter course seems to be a more adequate solution of our problem —efficient biological instruction adapted to all our educational strata.

AMERICAN NATURE-STUDY SOCIETY

The first directory of members of the American Nature-Study Society will be published in November of this year and will contain the names of all members whose annual dues ($1.00) are paid for 1908. It is important that this directory should register from 1300 to 1500 names of teachers, authors, school officials or public-spirited citizens who are interested in increasing and improving any studies of nature in elementary education. During the autumn months the officers of the Society will attempt to increase the membership and the hearty cooperation of all members now enrolled is needed.

Attention of persons who may become interested should be called to the fact that the Society is not committed to any limited creed of nature-study, but stands for (1) the investigation and (2) the advancement of all phases of study of natural things desirable for elementary education. With such a broad platform the Society appeals to all persons who are seriously interested in biological nature-study, physical nature-study, elementary physiology, elementary agriculture, school-gardening, home geography, and manual training in correlation with any of these. In all these lines the A. N. S. S. will undertake important work looking towards unifying, correlating, and firmly establishing studies of nature as an integral part of elementary education.

To all who believe in the aims of the A. N. S. S.—Will you not give your co-operation in at least one of the following ways? (1) Instruct the Secretary to enroll you as a member, ($1 per year), life member, ($20), or patron, ($100). (2) If you are connected with a school or college, enroll the institution as a member in order to have THE NATURE-STUDY REVIEW for reference of teachers and students. (3) Enlist the interest of others, especially in your own State. (4) Subscribe to the publication fund.

Application blanks may be obtained from the Secretary of the

Society, but are not necessary. Simply write as follows: "I am interested in the aims and work of the A. N. S. S. and wish to be enrolled as a member. I enclose $1.00 as my fee for the year 190—. Send the official journal (THE NATURE-STUDY REVIEW) without charge to the address given below. My official position or business (for the directory of members) is ———." Make money orders or checks payable to American Nature-Study Society, and add five cents to checks on banks not in the free exchange limits of New York City, Boston and Philadelphia. Mail to Secretary of A. N. S. S., 525 West 120th St. (Teachers College), New York City. Receipts are sent for all remittances.

New members enrolled before the directory is published for 1908 will receive all numbers of the official journal for 1908 and three numbers of 1907 which refer to the organization of the Society. For a limited time, a full set of 1907 and 1905 will be sent to *new members* who enclose 50 cents extra or 30 cents for one of these years. A full set of THE REVIEW from the beginning in January, 1905, can be obtained through former subscribers for $4.50 or $5.00, depending upon the condition of certain rare copies of the 1906 volume.

NOTES

Methods of Attracting Birds around our Homes. The undersigned is preparing for the National Audubon Society a monograph on "Methods of Attracting Birds around our Homes." He desires to make this suggestive, especially to teachers for school use; and to that end he asks that any who have had experience in this line of work in connection with schools or elsewhere will cooperate by sending him an account of their methods and results. Photographs will also be welcomed.

Passaic, N. J. GILBERT H. TRAFTON.

Sale of Bird Plumage. Recent issues of *Bird Lore* have called attention to work in the line of prohibiting the sale of plumage of protected birds. Recently a raid has been made on millinery firms in Columbus, Ohio, resulting in fines of from $25 to $50 for having in possession aigrettes. It is reported that the dealers have cancelled their orders with New York firms for all bird plumage which is effected by the law. Similar reports have come from other States, and it is evident that the very efficient Executive Department of the Audubon Societies is making rapid progress in securing enforcement of the laws. In fact, this is only one line in which the laws are being enforced and those interested in bird protection should read regularly the department of *Bird Lore* devoted to reports concerning the legal work of the Society.

Injured Sycamores. Last year it was reported in several botanical journals that the leaves of the sycamore trees had been injured by frost. Later it was stated on the authority of prominent botanists that early the trouble was not due to frost but rather to the attacks of a fungus. In the Report of the Missouri Botanical Garden, Dr. Von Schrenk states that the leaves were killed by the severe frosts. This explanation seems more reasonable because the injured trees were scattered over a wide territory. However, it is certain that a fungus does grow on the leaves, and it is difficult to decide whether frost made conditions favorable for the fungus or whether the fungus itself killed the leaves.

Bird Migration. In the April and May numbers of *School Science* and *Mathematics*, Professor Walter of Brown University has contributed an interesting series of articles on theories of bird migration. It is interesting to note that the following explanations have been offered for migration: Instinct, magnetism, semi-circular canals, sense of direction, landmarks, and follow-the-leader. Professor Walter is inclined to think that an adequate explanation for the path of migration is found in the temporary leadership of some individual within sight or hearing of the others who knows at least a fraction of the way by experience and strikes out a safe path by means of landmarks. As to why birds migrate there are theories based on temperature, premonition, short days and food supply as explanations of why birds go south; and instinct, homesickness, a desire to disperse, seeking nestling food or safe nesting sites are offered as explanations of why birds go northward in the spring. In summarizing the whole matter, Professor Walter concludes that in spite of the great mass of interesting theory and observation we not only do not know *why* birds migrate but as yet we do not know *how* they migrate except in a general way. For example, the naturalists from Aristotle to the present day have failed to find where the swallows pass the winter. "Until the store of facts as to why birds migrate has greatly increased, we can only delight ourselves with interesting explanations as to why birds migrate, acknowledging the problem unsolved."

Nature-Study Exhibit. At the next meeting of the New York State Science Teachers' Association to be held at Syracuse during the Christmas vacation there will be an exhibit of materials, apparatus, charts, aquaria and other things that biology and nature-study teachers find useful. The exhibit will be made up of the things actually in use by the teachers of the State. One afternoon will be spent examining and explaining the exhibit. Prof. O. C. Kenyon, of Syracuse, is president of the Association.

American Health League. The Committee of One Hundred, of the American Association for the Advancement of Science, on National Health is organizing the American Health League in furtherance of the cause for which the Committee of One Hundred was originally appointed, namely the betterment of the national health. The annual dues will be $1.00 to $5.00 per year and the official organ, *American Health*, will be sent to members free of expense. The first number of that journal has recently appeared. As a suggestion of the kind of big problems with which the American Health League will deal, we take the following from a letter recently sent to members:

Which of the following conditions effecting public health at the present time presents the most imperative demands for attention from the next Congress and should command widespread popular justification?

(a) The facts that the Ohio River represents a thousand miles of typhoid fever, and the Hudson River a cloaca maxima from Albany to the sea; the prevalence of deadly infection among millions of our people, arising from the contamination of drinking water, and of ice, and the rapid increase of pollution of our rivers, the boundary lines between states, which only federal authority can control; or

(b) The facts, that out of 80,000,000 of our people, 8,000,000 must perish from tuberculosis, the white scourge, which with proper regulation enforced by the federal power can be exterminated as completely as the once dreaded smallpox; and that the uniform enforcement of national health regulations in all states is absolutely imperative, because infected persons travel from state to state spreading the disease; or

(c) The facts, that the public have no means of obtaining reliable health information, and the thousand questions which anxious fathers and mothers ask themselves go unanswered simply because there is no office at Washington equipped for the purpose. If strawberries wilt in New Jersey or lambs fall sick in Arizona the Department of Agriculture gives elaborate instructions as to what should be done. But two millions of human beings die each year, a large proportion, and literally because they cannot find out how to live.

American Egret. The April number of *Bird Lore* has an interesting article on the home life of this bird by Dr. Chapman. The illustrations from photographs are especially attractive.

Alexander Wilson. The March number of the *Wilson Bulletin*, published at Oberlin, Ohio, contains an interesting article on the famous ornithologist. It especially discusses the famous misunderstanding between Audubon and Wilson.

Birds-Eye Maple. The cause of bird's eye appearance in maple has never been satisfactorily explained by botanists. A recent writer believes the eyes to be due to adventitious roots which do not continue to develop. A possible objection to this theory is that maples rarely produce this kind of roots. [*American Botanist.*]

Double Flowers. It is interesting to note that certain double flowers are not so much in demand as formerly and that there is a tendency towards cultivating the single or natural varieties. [*American Botanist.*]

Hydrophobia. Recently great interest in the subject of hyrdophobia in dogs and cats has been developed in the United States, particularly in and near New York City. A recent circular of the Department of Agriculture deals with the disease and points out that it is becoming increasingly prevalent. Reports of a society dealing with cruelty to animals have given the impression that it is not a real disease, but a product of the imagination. That this is not true in all cases has been demonstrated beyond doubt, but it is equally clear that mad dog scares are very frequently caused by animals suffering from some temporary cause like indigestion or mistreatment. For the real disease there is only one treatment, namely the Pasteur

method; and in cases where competent veterinarians find that a dog has the disease, persons who have been bitten should be sent at once to the Pasteur Institute for treatment.

NOTES ON NEW BOOKS AND PAMPHLETS

The Boy Problem. An excellent 36-page pamphlet with this title, dealing with the problem of sex instruction, has been published for parents and teachers by the American Society of Sanitary and Moral Prophylaxis. It may be purchased from the Secretary, Dr. E. L. Keyes, Jr., 109 E. 34th St., New York. Price 10c per copy or $3 for 50. A special pamphlet "For Teachers" is also for sale at 10c per copy.

Arbor Day and Bird Day in Illinois. The Annual Circular issued by the Superintendent of Public Instruction is an especially attractive pamphlet of about 100 pages. Most interesting of the papers which it contains are one on Animal Pets, by Professor F. L. Charles of DeKalb, and the one on Winter Birds, by Professor T. E. Hankinson of Charleston. The paper on Animal Pets is especially worthy of mention because of the splendid, original illustrations showing a wide range of possibilities in the line of pets. There are dogs and cats of many breeds, goats, horses, sheep, calves, rabbits, guinea pigs, chickens, squirrels, bears, raccoons, foxes, snakes, lizards turtles, ferrets and many birds and a coyote which have actually been adopted as pets at the DeKalb State Normal School. The excellent photographs and descriptions of the habits of these pets will do much to encourage this phase of nature-study work.

Practical Nature-Study. By John M. Coulter, John G. Coulter and Alice J. Patterson. A preliminary, limited edition subject to alterations and additions. It is a manual for the use of teachers and normal students. The first chapters deal with the mission of nature-study, the dangers of nature-study, the principles and spirit of nature-study. This is followed by a topical outline for all the grades of the elementary school. The advanced sheets in hand show only the first forty-two pages of the book, but others are in preparation and will probably be ready before September. The writer of this review is informed that the authors will sell at cost price copies of this preliminary edition until it is possible to issue the final edition. Correspondence concerning the book should be addressed to Professor J. G. Coulter, Normal, Illinois. It ought to be in the hands of every normal-school teacher who is attempting to prepare teachers of nature-study. Price 58 cents, postpaid.

Nature-Study. By F. L. Holtz. New York, Scribner's Sons, 1008. Pp. 546, illustrated, $1.50. This new book by Professor Holtz, formerly of Mankato, Minn., Normal School and now of the Brooklyn Training School for Teachers in New York City, is designed as an aid and guide for teachers and a text-book in nature-study for normal and training schools. Part I is a discussion of underlying principles and methods and Part II is an excellent discussion of subject-matter of the biological nature and with practical hints and suggestions on handling material and presenting les-

sons. Part III is a course of study for eight grades. The appendix contains many references. The book is a valuable contribution to nature-study literature and will certainly do much to solve the difficult problems with which many teachers in schools are confronted, and it will also give much-needed help in the training of teachers in many normal schools.

Guide to Nature. The second number of this new magazine contains several interesting articles, especially in the sections devoted to growing plants, domesticated animals and photography.

American Botanist. This valuable popular magazine of botany has now been changed from a monthly to a quarterly, and the subscription price is 75c a year. It is especially valuable for notes. It will continue to be published by the editor, Dr. W. N. Clute, Joliet, Ill.

Plant Breeding for Farmers. This is the title of an important pamphlet recently issued by Cornell University. It is especially valuable because of its suggestions for improving through selection many of the common varieties of cultivated plants.

German Report on Nature-Study. Dr. W. Schoenichen, editor of *Aus der Natur*, whose address is Friedenau-Berlin, Germany, has recently published an interesting report on nature-study in the United States. It strikes the reviewer as a very fair interpretation of the best work which is now being done in this country.

Leaflet on Cotton. A recent addition to the series of Hampton leaflets is devoted to cotton. It will undoubtedly be a valuable publication for teachers in southern States.

Conservation of Natural Resources. This important pamphlet by the United States Forester, Mr. Pinchot, is especially interesting at the present time. It deals with resources in forests, minerals, oil, natural gas and soil; and points out the importance of considering all of these resources together. As is well-known, we are rapidly tending to exhaust our natural resources and this paper points out the great importance of careful studies of methods of conservation.

Books on School-Gardens. The Children's Museum Library of Brooklyn, New York, has recently printed a selected list of books on "Nature-Study with Special Reference to School-Gardening." Each book is briefly characterized and its important features mentioned. The list may be obtained without cost by any teacher upon application to the librarian.

Children's School Farm. A report concerning the work of this interesting school-garden in New York City has been published by the editor, Mrs. Henry Parsons, of 29 West 56th Street, New York City. It gives a very good account of the childrens' school farm at the Jamestown Exposition, last year.

What Forestry Has Done. A pamphlet of this title published by the U. S. Department of Agriculture points out the values actually obtained from application of principles of forestry in Germany, France and other European countries. It is interesting to note that France and Germany spent $11,000,000 last year on their national forests containing about 14 million acres and obtained net returns of $30,000,000, while the United States spent $1,400,000 on 160,000,000 acres of national forests and secured

a net return of less than $130,000. Aside from such financial facts, the pamphlet contains many others, especially pointing out the value of forests as protective covering for the soil and relation to water conservation. It will be a valuable pamphlet for teachers who deal with principles of forestry in their nature-study work.

Farmers' Bulletins. The Department of Agriculture has published an index to these valuable bulletins and thus the contents are made available for school or practical use.

High-School Agronomy. A recent circular of the Department of Agriculture outlines a high-school course for one of two years recommended for agriculture in high schools. The pamphlet gives a syllabus and outlines of work, general instructions to teachers, and references. A teacher of general science who carefully reads this outline will note the numerous duplications of work already done in the regular science courses, and it becomes evident that the problem of articulation between existing courses in biology, chemistry and physics and proposed courses in agriculture ought to be carefully considered in these early days of high-school instruction in agriculture. Otherwise it is quite probable that in our enthusiasm for agriculture we will attempt to do some work which in later years will have to be decidedly changed.

Poison Ivy and Swamp Sumach. This is the title of a beautifully printed little book of 58 pages written by Annie Oakes Huntington, author of the well-known "Studies of Trees in Winter." The book is intended for people who indulge in an out-of-door life and therefore need to know these poisonous plants. The descriptions and the pictures make it possible to recognize the plants at any season of the year. There is an interesting account of the latest studies regarding the poisonous effects of these plants. The price of the book is 75 cents and it may be obtained from the author at 31 Glen Road, Jamaica Plain, Mass.

Insect Manuals. The Funk & Wagnalls Company of New York has recently sent to the office of THE REVIEW two small Manuals of Insects prepared by Dr. Beutenmueller of the American Museum of Natural History. One of these small hand-books deals with common butterflies and moths; the other deals with other insects. The booklets consist entirely of colored pictures of insects and about 120 species are figured in each book. They ought to be very useful for teachers who do not have the larger books with colored plates. The booklets referred to sell at 25 cents each.

NEW BOOKS RECEIVED

Nature Study Made Easy. By Edward B. Shallow and Winifred T. Cullen. Pp. 136, illustrated. A guide for teachers and pupils, New York: The Macmillan Company, 1908. $.40.

Nature Study. By David Worth Dennis. "One hundred lessons about plants." Marion, Ind. Teachers' Journal Printing Co., 1906.

American Birds. By William Lovell Finley. "Studied and photographed from life." Pp. 247, illu. New York: Scribner's Sons, 1907. $1.50.

DISCUSSIONS

Organization of Nature-Study Lessons. The suggestions in the October and November 1907 issues of this magazine will be helpful to all teachers who attempt to organize nature-study facts into lessons. However, there is a possible danger in such outlines or formulas in that teachers may fall into a deadening routine. Also, the best of formulas for lessons may at times fail to center attention on the most important or most interesting point and may fail in pointing the way to the big problem which might be chosen for study. As an example of a lesson plan organized quite independently of the formula approved by Professor Guyer and by Dr. Taylor, the following study of radishes may be described:

Two years ago one of the graduate students in Teachers College planned to raise some vegetables in the greenhouse and radishes were chosen because of their many advantages for such work. In order to have some problem as a center around which to organize the work, the attention of the children was called to the fact that radishes are grown under glass by gardeners near New York City and that the most important problem with which such gardeners must deal is the selection of the most profitable radishes which can be grown under glass in the winter. By reference to the seed catalogues it was pointed out to the children that there are a great many possibilities in selecting varieties. There are radishes which are scarlet, red, white, yellow and black and mixed colors and any of these colors may be found in varieties which are turnip-shaped, oval or long forms; and that by combining color and form it is possible to pick out many distinct varieties of radishes. Seeds of ten of these varieties were chosen and the ten packages were mixed in the schoolroom. The children planted them in boxes in the greenhouse and after about twenty-four days the plants were ready for the lesson. It was pointed out to the children that the market gardeners must consider the following things:

First, what variety comes to maturity in the shortest time, because of course this makes possible more crops in the year.

Second, what variety, owing largely to the relative smallness of the leaves, takes the least space and therefore makes it possible to grow the largest number of radishes per square foot. Third, what variety has the most attractive color and is therefore most likely to appeal to purchasers. Fourth, what variety is finest in flavor and texture. These four problems were carefully worked out by comparison of the abundant specimens, and to my surprise the result was that the conclusion of the pupils pointed to the red, turnip-shaped, forcing radishes which are the favorites in the New York markets and have proved most profitable from the gardeners' standpoint. These came to maturity in about twenty-one days, while some of the long varieties had scarcely begun to thicken the roots. The red color is especially attractive. In proportion to size of roots the leaves of this variety are remarkably small and hence a much larger number can be grown on the square foot of surface. As is well-known, the flavor and texture of this variety is all that could be desired in a radish.

Here is one example of a nature-study lesson organized independently of any formula and simply based on a practical problem. The teacher needed no formula or set of questions, but simply some idea of gardening. The results from such a lesson were in my opinion very superior to any which could be obtained if the radish had been studied under the formulas suggested in this magazine last October and November. Many other such cases have come to my attention and so I am inclined to urge that *whenever possible* to organize a nature-study lesson around some problem which is full of appealing interest, such a plan for organization should be adopted, rather than any set formula. In fact, I am inclined to believe that a teacher whose information about the material is sufficient to make her a good teacher of nature-study will do best to cut loose from all set formulas and instead develop every lesson from the center of greatest interest, especially from the standpoint of the interests which are most intense in the children.

M. A. Bigelow.

THE
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NEW JERSEY NUMBER

[MANAGING EDITOR'S NOTE.—The papers for this number have been collected and arranged by Mr. Gilbert H. Trafton, Supervisor of Nature-Study at Passaic, N. J., and one of the 1908 Directors of the American Nature-Study Society. As in the case of all other special numbers of THE REVIEW, the managing Editor has simply taken charge of the mere mechanical editing necessary to secure uniformity in printing the series of special numbers."

The following paragraph from a personal letter from Mr. Trafton well states the editorial policy for this number of THE REVIEW:

"I have endeavored to make this issue a record of actual performance, a discussion of work actually being done, believing that these kinds of records will be of value to other teachers as suggestive of what may be done and of value to all interested in nature-study in any capacity, as a means of orientation and as furnishing opportunity for intelligent criticism, that the work that is worth while may be encouraged, and that which is worthless condemned.]

WANTED: A PHILOSOPHY OF NATURE-STUDY

By C. H. ROBISON
State Normal School, Montclair, N. J.

By coming into practical agreement as to what nature-study really is and is not, the leaders in the nature-study movement have taken a great step forward. We do not, however, find a correspondingly convincing assurance regarding its justification in the curriculum, regarding what we hope to do, or what should be the final product in education.

Our choice of subject-matter must depend on our aims. Noting differences between the serrate edge of the leaves of the elm and beech requires closer observation and keener discrimination than distinguishing between the potato-bug and the lady-bug that eats its eggs; but with aims other than mere practice in sense perception the former furnishes much less valuable material than does the latter, especially since there are other much better ways of distinguishing the trees.

In no less degree does our method of approach depend on the philosophic basis of our theory; on whether we regard the child as a member of a present and a future society or as an isolated individual, as a social creature or solely as an intellectual being; on whether we regard education as a process of adding on adult ideals or as a "re-making of present experiences." While quite generally rejecting the classification of phenomena made by the scientists, the question may be raised whether our "naturists," if we may so call them, have gotten away from adult standards of interest and have sufficiently adopted the child's valuation of a given subject of nature as the criterion of use or of approach, be it a valuation from the standpoint of his personal needs, or of needs of society as he recognizes them.

Leaders in methods of teaching reading, history, and even arithmetic, are straining every nerve to provide in those subjects opportunities for the child to participate in real social situations, as witness the dramatizations, the play store, the class savings bank, and even the demand upon nature-study by these branches to help them out in this respect. Yet in nature-study, rivalled

only by manual training in such potential opportunities, have not our writers quite largely taken this social activity for granted as a part of the instruments for certain disciplinary ends, and do they not seem to have failed to view such participation as a social end in itself? It is as if nature-study must not lag behind any other study in claims to disciplinary value; when in fact we are not sure that much that is ascribed to discipline is not really a matter of selection.

Both aims and theory are still in a chaotic state, and are in need of a master's treatment. Some of the aims, as practically expressed by superintendents in a large number of courses of study, are not the peculiar possession of this branch of the curriculum. Some are trivial. Some are vigorously called into question by recent experimental psychology, such as the supposed training of various general "powers" or "faculties" of the mind by exercise in narrow limits. This "training" has been so exalted that the real thing of nature as such becomes a subsidiary matter, a mere tool, and leads to a disregard of the question of whether it has worth in itself, either from the standpoint of society in general or of the immediate world of the child. Psychologists hold that the amount of improvement in a general ability resulting from practice within narrow limits depends on the elements common to all the acts of observation. Is it true, as suggested by some psychologists, that these are much fewer than commonly supposed, and therefore, that there is not the general improvement so generally claimed?

Who will rise up and determine these common elements, and with carefully devised units, measure the amount of improvement? Exact studies have been made in memory, sense discrimination, and muscular activities. More or less successful efforts have been made to measure quantitatively the relation between certain methods of teaching and the results in spelling and arithmetic. Why not in nature-study? Much of our procedure must rest on such determinations or on faith.

While some of the questions raised might be treated more at length, these remarks are intended only to call attention to the fact that, while the *what* is rather definitely understood, the *why* leaves much to be desired, and that the *how* must be largely conditioned on a clearly worked out rationale.

A SURVEY OF NATURE-STUDY IN NEW JERSEY

By EMMELINE MOORE
State Normal School, Trenton, N. J.

In general, it may be said, that nature-study is not yet properly amalgamated into the curricula of the schools of New Jersey. But viewed in the light of experiences through which other States have passed, this unsettled condition of things is not unusual or exceptional.

In some sections of the state a lethargic attitude toward the subject has prevailed for a long time; in others, the over-ambitious program in nature-study has fallen into a state of innocuous desuetude; and in still others, the energy of teachers and superintendents has been expended largely in dodging the issue. Nevertheless a majority of the leading educators of the State have recognized, from the first, the value of nature-study and have persisted in giving it a place, even though it has not always been an adequate one, in the school curriculum.

Despite the general indifference in certain localities, it is apparent that the State has made slow but definite progress in nature-study. Moreover, it is a significant fact that the recent wave of industrial education has very materially accelerated the pace throughout New Jersey.

Reports from county and city superintendents show that nature-study appears in a more or less general way in all but three counties of the State. A deplorable condition brought to light by these reports is that very little nature work is being done in the smaller towns and rural districts, places where it should from the very nature of the subject receive the most attention. In many schools, also, where nature-study is scheduled it is dropped in the upper grammar grades.

As a rule there are outlines or syllabi, infinite in variety and purpose. In some instances these are based on a topic of local interest. In other cases the work is apportioned to cover a broader field by giving attention, and very properly so, to the biological, geographical, and physical phases. In still other outlines, the work is vast enough in scope to do credit to a university course. It is evident, too, that much work which passes for nature-study resolves itself into reading, language, or drawing lessons.

In those cities and towns where there are special teachers in nature-study this subject is one of the potent educational factors of the community. Indeed there are many grade teachers here and there whose progress in nature-study teaching is noteworthy. The majority of grade teachers, however, by whom much of the nature-study is carried on and by whom much of it will necessarily be conducted in the future are worthy subjects for consideration, because few are adequately equipped for the work and few have a natural aptitude for it. Teachers who are rather bookish conduct nature lessons with reluctance. Many teachers are afraid of the discipline in a field excursion or afraid of handling nature-study materials indoors. To such nature-study does not pose as a panacea for all the ills of discipline in a schoolroom but it does create an added interest in school work. Were the training of the mind not considered, the added interest in itself would be cause enough for its being in the curriculum.

The Trenton Normal School, the various city training schools, and special teachers are giving much time and attention to the training of student teachers along nature-study lines. Moreover the activity of the State Department of Education in promulgating courses of study for teachers as well as pupils in this subject is an added source of encouragement.

The general awakening to the need of the more practical phases of education; a more tolerant attitude toward nature-study by teachers of the more classical turn of mind; and a revision of courses of study to satisfy in part, at least, the claims of nature-study are unmistakable and hopeful signs of growth. Perhaps the most hopeful indication, because the most immediately fruitful of results, is the consideration that is being given to the subject by our State Science Teachers' Association at whose meetings the discussions along nature-study lines is one of the chief sources of interest and profit.

Now that the stimulus for greater effort has been given, it is necessary to agree upon a plan of action which will give greater unity of purpose. In agricultural communities nature-study will necessarily take an agricultural trend; in the so-called industrial centers it will in part follow along lines of those pursuits. But what ever the locality or industry the main purpose should not be to introduce the science of agriculture

or the teaching of the various trades however much we may be laying the foundation for specialized effort along these lines in later years.

NOTES ON NATURE-STUDY IN NEW JERSEY

By GILBERT H. TRAFTON
Supervisor of Nature-Study, Passaic, N. J.

Nature-study is quite favorably looked upon by the school authorities throughout New Jersey. There is a very general sentiment in favor of giving it a trial, and in the last few years it has been introduced into quite a number of our towns and cities, in addition to those which had previously included this in their curricula. It does not follow however, that in all these places effective work is done, for there exists the same difficulty here as elsewhere, the lack of teachers properly trained to teach this subject. But the introduction of the subject into the curriculum is the first step and a very essential one.

The following statistics, which were furnished by the State Department of Public Instruction indicate the extent to which the subject is considered as a part of the curriculum.

The following cities have nature-study in all grades: Burlington, Montclair, Morristown, Newark, Orange, Passaic, Paterson, Plainfield, Trenton, Woodbury City, Lakewood, Westfield, Cranford, Roselle. The following have the subject in the first five or six grades: Bayonne, Camden, East Orange, Englewood. The following have it in the elementary grades: Bloomfield, Jersey City, Millville, New Brunswick, North Plainfield, Rahway and Weehawken. Bridgeton, Dover, Salem, Town of Union, Livingston, Norma (in Jewish public schools) teach the subject to some extent in their schools. In the counties of Bergen, Hunterdon and Mercer it is quite general and in Warren County is found in a few schools.

The State Board of Education has taken a special interest in the development of industrial education in the public schools, and recently adopted the following resolutions:

"Resolved, that it is the sense of the State Board of Education that a knowledge of manual training, home economics and elementary agriculture should become a part of the professional equipment of each teacher in the public schools of New Jersey.

"Resolved, that the Committee on Education consider the propriety of adding to the list of subjects in which every person must be examined the subjects mentioned above in order to receive a license to teach in any of the grades below the high school, or in any department of industrial or manual training in a high school, and of requiring that no course of study shall be approved by the State Board of Education, unless it shall include proper courses in manual training, home economics and elementary agriculture, and when the same shall take effect, and to report to this board at its next meeting."

Inquiries were sent by the writer to most of the cities and towns in the State relative to the work in school-gardens. The replies indicate that very little is being done along this line, only seven reported as attempting anything of the sort: Glenridge, Jersey City, New Brunswick, Newark, Nutley, Montclair, Passaic and Trenton in connection with the city and state normal schools.

In a few other cities seeds have been distributed to the children to plant in home gardens. In Passaic the Cleveland plan of selling penny packets of seeds to the children has been adopted for several years with very satisfactory results. Much enthusiasm has been aroused and the interest has gradually increased. Last Spring about 3000 children (approximately one half of the total enrollment) bought a little more than 10,000 packets. Some years flower shows have been held in the Autumn at the various schools and prizes awarded, or prizes have been given for the best individual gardens. A valuable feature of this line of work is that it connects the school with the home life. A similar plan has been followed in East Orange.

In Montclair and Passaic the school-gardens have been established for five or six years. The following note is from F. C. Clifton, Principal of Chestnut Street School, Montclair:

"We have been doing school-garden work in Watchung School for six years and in Chestnut Street School for three years with satisfaction to pupils and teachers, making the work a part of the course in nature-study and field work. Quite a definite course of study is followed, our idea being that the only justification for garden work, is its value as means of instruction. We have 650 gardens, four by eight feet.

"After having tried the various kinds of gardens, flower and vegetable, individual and community, spring gardens and gardens

running over the summer and into the fall, we have decided upon the use of the spring vegetable garden as best suited to our needs and sufficient in both time and opportunity for this phase of nature-study. We make little of the garden as a means of manual training, except to insist that whatever is done shall be done well."

In Passaic the garden work has been carried on in connection with three schools. In one school, where most of the children had home gardens, a large bed was planted in mass for decorative effect; in the other two schools, the garden was divided up into individual plots and the time assigned to nature-study was employed entirely in working in the garden. The planting has been restricted largely to early maturing vegetables and flowers, but this season two experiments are to be tried in the summer care of the gardens. In one case committees of children are to be appointed to come each week to care for the garden; in the other case, a prize is to be given to the child having the best garden at the opening of school in fall, and those who wish to care for their gardens during the summer may have the use of any land left by the other children.

In a school-garden at Passaic, N. J.

At one side of the garden have been set out plants of the grape, strawberry, blackberry, raspberry, currant and gooseberry; and seeds of apple, pear, cherry, peach and plum have been planted. These plants will be used to teach the children the various methods of propagation used to raise these fruits. The seeds of a few shrubs and perennial vines were also planted.

These will be used to decorate the school grounds and the borders of the garden; and the extra plants will be given to the children to set out in their home grounds.

In Jersey City school-garden work has been done for several years at Public School No. 17 under the Principalship of Miss Martha G. Evans, who contributes the following notes:

"Our first attempt was made in 1901, the garden plot being made on or in a "dump ground." The pupils did most of the gardening before nine o'clock and during the noon hour, very little of the school day being given to this out-of-door work. The children's observations gave excellent material for thought, to be expressed both in oral and written work, and they wove them into stories, illustrated by sketches from the plant in hand, thus giving an opportunity to use one of the best methods in drawing.

"In the spring of 1905 the janitor spaded and prepared a sunny space, 15 by 50 feet, and the pupils of the lowest grade had a garden. The little folks planted the seeds, watered, weeded and daily watched the development, and took entire care of this, their own garden, under the guidance of their able teacher, Miss Mary C. Davies. When the radishes matured, each child of this class pulled with great pride, the largest one he could find to use for an object lesson or to take home to mother. All classes in the department were taken to the garden several times during the season to observe and study the points of plant work as outlined for each grade in our course of study. Each pupil of the department had at least one radish to use as an object for drawing, or story writing."

"The last week of June was one of delight to all the garden workers, when the peas and string beans were ready to harvest. The little ones of the baby class, all on the lawn, with the vines, picked and shelled the peas. The teacher cooked them and that afternoon a feast was enjoyed. To the child it was a feast from MY garden."

"A few flowering plants were also cultivated and they were in full bloom and splendor on our return in September, but the children enjoy the vegetable garden more than the flower garden."

A long felt need in the State is now met by the opening of the new normal school at Montclair. A course in nature-study will

be given four periods a week during the first year of the curriculum. Several acres of the large grounds will be devoted to school-gardens. The departments of Nature-study and Geography are in charge of Dr. Clarence H. Robison.

At the Trenton Normal School one half year courses in botany and zoology are given during the first year, five periods a week. The Department of Biology, in which Professor Apgar rendered such long service, is now in charge of Dr. Robert G. Leavitt.

For the past two seasons a Summer School of Agriculture, Industrial Art and Science has been held at Cape May. Courses have been given in elementary agriculture, home economics and manual training. During the season of 1908 the work in elementary agriculture was under the charge of Professor H. O. Sampson of the U. S. Department of Agriculture.

ELEMENTARY SCIENCE IN THE SCHOOLS OF NEWARK, N. J.

By DAVID B. CORSON,
Assistant City Superintendent.

The claim is made by some that elementary science should be in the curriculum as a supplement to geography or some other branch, but it should be taught for itself or not at all. That it does correlate with other branches is apparent. It is interrelated with the geography in the study of the various animals, first as types in the environment and then in the different zones as related to the types. Geography calls for a study of ocean currents and winds, tides, and climate in general. These various topics can be clearly apprehended only when their causes are understood. Their causes are solar and not terrestrial. A proper course in elementary science requires the observation and study of the sky, including the sun, moon and the planets. The child will better understand the earth when he realizes it is a planet; that is, that there are other heavenly bodies beside the earth that revolve around the sun and are influenced by gravitation, solar light, and heat. The study of trees is both an elementary science and a drawing topic, and the one subject reinforces the other. The subject also correlates very closely with the music in the first and second years inasmuch as many of the songs used in these lower grades relate to birds and flowers and other

natural objects. These correlations are not forced or artificial in character, but are natural. They must not be permitted to rob the subject of a place in the curriculum.

The expert biologist, at the present time, is inclined to emphasize too much the utilitarian view of his subject, especially in connection with elementary work. All phases of it must have an economic coloring to meet his approbation. While this may be right from one viewpoint, it cannot be entirely so from another. To study a pine tree in order to recognize another of its kind is justifiable in itself. The man who knows the pine tree will be profited in discussing the uses to which its products are put. The student will be profited, too, after he has become familiar enough to be able to relate the information acquired to the tree itself. For the elementary pupil, economic values cannot be the only ones sought either in the biological or other divisions of elementary science. Its chief purpose in these grades cannot be to furnish knowledge and to exercise the intellect. Its appeal to the emotional or feeling life, should not be ignored.

The true aims in teaching elementary science as a subject in grades below the high school are to create a love for nature and to arouse interest in plants and animals and in the ordinary phenomena in the world about the child. The ability to observe carefully and to perceive quickly is trained by the proper treatment of the subject, and much information is obtained; these results, however, are less valuable in themselves than are the attitude and habit of mind which the observation and study of nature develop. Kindness to animals, a delight in plants as living things, and a love and enjoyment of the beautiful and the wonderful in nature's adaptations and operations are more desirable ends to be sought.

There are two aspects of biological science that must be considered in any plan for the elementary school. One is the approximate description for identification of plants and animals, and the other, the observation of the living animal and the growing plant. The descriptions suggested should not be such as the scientist or even the adult student would give. They should be made without any thought of the analytical method used by biologists in high schools and colleges some ten or fifteen years ago. They are merely a means to an end, the study of the life history of the specimens being considered far more important. The observational work should not, on the other hand, degenerate

into mere entertainment, lacking point and worthless in results. Neither of these aspects can be altogether profitable without the other, but one is secondary, and the other primary in importance.

We have arranged the material for study in the lower grades in concentric circles, each succeeding one requiring more ability on the part of the children and opening new fields of effort and discovery. While the material is not entirely identical, it is much alike. In successive years the treatment of the same kind of specimen is somewhat different, to preserve the interest and to call into activity the developing power of the children. To illustrate, plant study includes the observation of germination, the study of the growing plant in window boxes, and the keeping of a school-garden. For younger children the apparent thing will be the plant itself. The characteristics of form and color will appeal to them, and the pupils will naturally speak of the striking facts of appearance. Any attempt to force upon them things which the teacher considers valuable, or which the scientific expert claims should be taught will fail. When a little older the children will discover things not at first apparent. To tell children who have acquired some power to observe, that light is valuable for plants makes less of an impression upon them than to plant beans in a box in the dark corner of a room, and let them discover it for themselves. As the plants grow up under their observation and lean away over toward the light, they will say: "The plants need light." Such a fact will then be interesting, and the observation will be valuable. Again, when they have still greater power to observe and to perceive, they will study the more difficult things, such as pollination.

During the summer of 1907 there were maintained five gardens for the use of the vacation schools, and as many will be equipped in 1908. They were about fifty by one hundred feet, each in charge of a teacher. The gardens were plotted into individual plots varying somewhat in size in the different ones. There were raised beans, corn, lettuce, carrots, beets, each one in the same general order and arrangement. Those having charge reported very favorably upon the experiment and recommended that the school-garden be adopted as a permanent feature of our nature-study work. It is claimed, and rightly so, that in addition to the interest and love of plants it teaches incidentally order,

system, mathematics, thrift, industry, and is thus of great educational benefit.

The work of the Shade Tree Commission of the city is reinforced and the attempt is made to secure the interest and active cooperation of the children in the preservation of shade trees on the streets and shrubbery in the public parks. In some schools there are made tree maps of the school blocks. The Commission has been requested to distribute the elms, poplars, lindens, maples, and other trees so that the children might become interested in and familiar with the various kinds of trees, and to tag one of a kind on each city block to assist in their recognition. To some extent the request has been complied with, and it is believed it will be granted in full in due time. The study of trees is pursued in the winter as well as at any other season. Trees are as interesting then as at any time. The symmetry, the strength, the grace, and the delicacy are revealed in the winter even more than in the summer, but there is even here more involved than interest in the trees themselves, although that is of prime importance. It is to cause children to realize their part as members of society and the common duty of preserving and protecting that which is for the enjoyment and good of the whole community. Such instruction may be made valuable as part of the training for good citizenship.

The economic phase of plant life and the value and need of scientific culture of our forest areas receive attention. Arbor Day celebrations emphasize this, but it is taught also in the regular recitations. It is best, however, to have experts to do it. It is unreasonable to expect that the class teacher with many subjects and many practical difficulties to engross her attention should acquire the scientific information necessary. To insure the most satisfactory treatment, there has been given for two years, in the spring, what is called "The Children's Course of Illustrated Lectures in Elementary Science." The plant products useful to man as food, beverages, clothing, or medicine, and the study of plants injurious to man, mammals, birds, glaciers, pre-historic plants, electricity, light, sound, properties of matter (with simple experiments) were some of the subjects. The lectures were more instructive than entertaining, and the speakers were authorities in their respective fields. There was much interest on the part of teachers and children. The notes which

many of the latter took were afterward used in the language work as reports. The plan demonstrates the possibility of making this kind of work especially valuable in the development of a course of study in elementary science. The scheme followed was to divide the city into districts using certain school-houses as centers. To these were brought by their teachers the several classes of designated grades at four o'clock in the afternoon. Teachers were permitted to select the lecture to attend, although as a rule they went to the one in their own district. The lectures were about forty minutes long, and the time of the year selected enables all children to reach their homes before dark.

The preservation of birds is so necessary to plant life that the children are instructed as to their value so that there may be due appreciation of their worth and so that wanton destruction may be stopped. The close interrelation between birds and plants and insects and plants as shown in the seed eating and the seed carrying in the fall warrants the study of the two together. Whenever animals are studied, except in the lowest grades, attention is called to structure, and its wonderful adaptation to environment and to function, and as many specimens as possible are observed on the excursions to the parks and on the visits to the zoological gardens or the circus parade.

City schools are unfavorably located for the most satisfactory work in this phase. Schools in the suburbs have the opportunity to note the birds and insects in their habitat; those in the congested urban districts can have, as a rule, only the dead specimen near at hand. To supply the need for such specimens the Board of Education rented from the American Museum of Natural History fifty cases of birds, insects, corals, and woods, and their use has been very helpful. The city is divided into eight districts and once a month the boxes of specimens are moved from school to school by an employee of the Board of Education. This is in accordance with a prearranged plan, and records are forwarded to the office so that close personal supervision is thus insured.

In one school there is a room fitted up for experiments in physics, in several there are dark rooms for lectures with lantern illustrations, and in others there are aquaria in courts. The following is a report from Principal B. C. Miner of the Ann Street School of the work actually done in his school, and some opinions of his teachers:

"Interest began early in the spring by planting seeds in paste jars filled with sawdust and kept sufficiently moist to promote germination. Several jars were used in a classroom. Peas, beans and corn were planted. Seeds were also planted in the germination boxes made in the manual training shops.

"A 1b room lined a sand table with oil cloth, filled it with good rich soil, and started a small farm. Here they built a house, barn, chicken-house and coops, and made fences and farm utensils, etc., planted garden truck, sowed grass seed for a lawn and developed a small but well equipped farm.

"The kindergarten had a land turtle, a water turtle, polly-wogs, newts, frogs, and fish; also a space in the yard for the wild flowers transplanted from the woods—jack-in-the-pulpits, ferns, violets, etc. A family of ants lived comfortably in a fruit-jar in one room. Three classes tried their hand at gardening in the yard. Several classes furnished twigs of different trees and placing them in bottles of water noted leaf and blossom development. Last but not least the Board carpenters constructed a combination hutch and chicken coop, the home of Molly Cottontail, her two children 'Nig' and 'Gray,' a Plymouth Rock hen—nearly *pure blood* as the farmer who raised her wrote me—, and eight little chicks. These latter, rabbits and chicks, cost us $3.60, paid for out of the school fund. The children brought most of the green food for all the family to eat. The hen responded to the kindness shown her by contributing a few eggs, which of course added to the interest.

"Some 2,200 penny packets of seeds were purchased by the children from a Boston firm and gardens started at home.

"Miss L. reports that a week's occupation was gathered by a visit to the hutch.

"For illustration; hen scratching with her brood; in the coop at night; sitting on eggs; chicks breaking shell; chicks taking first walk; children gathering eggs; Henny Penny; Herr Oster Haas coloring egg; mother using eggs for cake.

"Manual work; coop; water pan; corn pan; basket for eggs; cotton chicks.

"They also noted the hen's kindness in caring for chicks, that she helped provide for them by scratching.

"Miss M. reports that the best set of language papers of the term was about 'Our Pets.' One child brought in beans sprout-

ing on moistened blotting paper. One poor boy to whom was given a few pennies for doing an errand wanted to buy seeds.

"Miss W.'s class noted that hens do not fly as birds do, and rabbits wash their faces in a manner similar to cats.

"A very interesting and instructive lesson was the result of transplanting our little plants to the school garden.

"Our nature work has brought the parents into closer touch with the school work, and this cannot fail to bring forth good results. The children have interested their parents to the extent that one hundred forty-two packages of seeds for home gardens have been distributed.

"The little ones are eager each day to report as to the progress of their home gardens and we not only see what benefits they derive materially but are unconsciously implanting in their hearts and minds seeds that will later blossom into the best kind of citizenship.

"The children are intensely interested in caring for the school pets, and every day brings forth fresh evidence that the idea is well worth fostering.

"Language and drawing have been interesting, instructive and entertaining because of the intimate association with our nature work. Songs, and most pleasing to state, nature thoughts embodied and set forth so beautifully in poems, have been studied with appreciative delight.

"Others report greater willingness to express themselves, more fluency in writing, better understanding of the uses of seeds. In the home gardens it was learned that all plants do not thrive under the same conditions. Real experiences were gained by actual care of gardens and animals; a better humane spirit.

"5A class reports—'Descriptions given of their observations of trees were in a large measure gratifying. Distinguishing between trees was quite clear.' "

There is in a number of our schools much usable material for teaching science lessons. This illustrates the subjects of mineralogy, geology, botany and other sciences; but it has been stored away so that no one knows just what is available. It is our wish that in each building there might be a special place to be known as the science room, and several have been established during the last year. Such a room enables principals to gather all their

resources into one place, to properly catalogue the same, and to assign a caretaker. It is expected that the class teachers will systematically arrange their lessons, and call for what they want. Without such a provision the elementary science collections are mere curiosities. Throughout the year, it is hoped to keep therein material illustrating germination and pollination and other important phases of botanical study; growing plants, insects in cages, fish, and some other living animals. In the outlying schools we hope to have a few bird boxes in the yards. They will more than repay the trouble of building them by attracting the birds.

A few years ago our schools were generously equipped with the "fact nature readers." During the past two years this stock has been reduced by wear as desk books until it is now nearly exhausted, and all requests to replenish have been denied. Most of these books were supplied for the primary grades. It seems almost needless to say that as a means of teaching elementary science they were useless, the children having too small a basis of knowledge founded upon personal observation to make the reading valuable. There can be no reasonable dispute as to the desirability of having children in grades below the sixth, study nature at first hand. In grades above the fifth there is a place for this kind of information reader, the world of the child having expanded beyond that of sense experience and his power of representation having developed so that he can profitably gain knowledge through reading. Even in these grades, however, elementary science should be studied by means of the real object and by experiment, the reader being entirely supplementary. The school of nature teaching represented by the works written by William J. Long and Ernest Thompson Seton has opened a new field for the children, and the pleasure given by books of this class is evident. Interest is aroused in animals as living beings, not as specimens, and sympathy is awakened in such a manner that the inclination to consider their needs, to care for and to protect them is created. They thus harmonize with the end sought in biological study in the elementary school.

NATURE-STUDY AT HOME

By EDWARD UEHLING, JR.
Passaic, N. J.

[The most effective kind of nature-study in the schools is that which so thoroughly touches the life of the child that he is lead to study nature outside of school hours and school lessons, and to acquire an interest and pleasure in it for its own sake.

The following contribution is given as an example of this kind of results. The author, now a boy in the high school, was in the 8th Grade at the time the work referred to in this article was done. G. H. T.]

Bird feeding in winter is exceedingly interesting and important. Important, because heavy snows hinder ground feeding birds from getting food, and heavy sleets prevent tree trunk birds from getting their food. Therefore, it is the duty of all bird lovers to aid their feathered friends by putting out food in winter.

The interesting habits of our aerial neighbors can, with a little patience, be easily studied at the feeding trough. The birds can be watched more closely while feeding than with a pair of glasses in the open field.

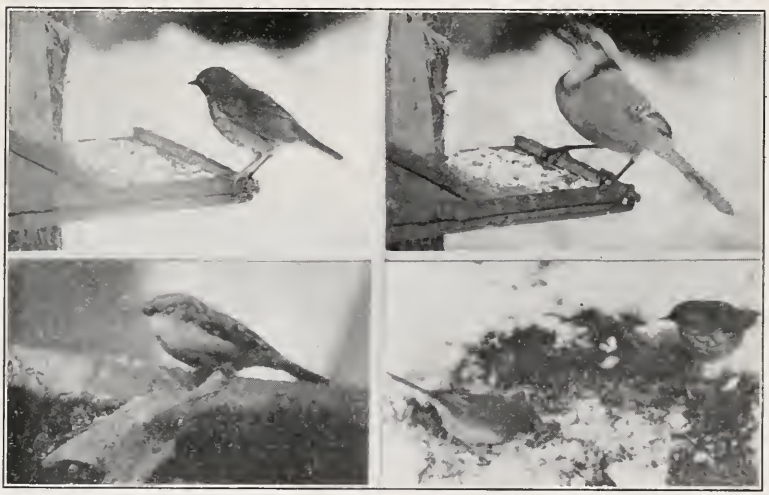
My first stationary feeding trough was placed about fifteen feet from the ground, on a sour-gum tree, on October 25, 1906. The tree is about thirty feet from the back of the house. Here I placed a supply of suet.

My next step was to put up a wire, slanting from my bed-room window to a tree near the stationary trough, a distance of about forty feet. I then made a moving trough to run on this wire by two pulleys. By attaching a cord to this trough, I could let it run down to the tree, or pull it up any distance between the stationary trough and the window.

Each trough had several partitions, made of thick bark, and the sides were covered with bark, in order to make the birds think it a natural trough, rather than an artificial one. The older the wood a trough is made out of, the better, but if old wood cannot be obtained the wood should be stained a dark brown. Bark on the sides not only makes the trough look more natural, but also greatly aids the creeping birds in getting food, as they can easily cling to it. After my moving trough was com-

plete, I put suet on it and let it run to the tree to wait for hungry birds.

There are many advantages in having a moving trough. In the first place, it is easier to pull in the trough to the window to add the food, than it is to walk to the trough in the snow. Another great advantage is that the birds can be made accustomed to feed a little nearer to the window each day, until they finally feed at the window sill. After birds feed at the window-sill, or near it, they can be closely watched, and their habits studied with little trouble.



Upper left—hermit thrush, a belated traveler. Upper right—blue jay, the autocrat of the lunch-counter. Lower left—brown creeper, the silent shadow. Lower right—junco and hermit thrush feeding together. Photographs by G. H. Trafton. (The picture of the brown creeper should have been placed with body vertical.)

On November 5th, a pair of white-breasted nuthatches were the first birds to discover the food, and they became daily feeders all through the winter. The next day a chickadee came to feed, but did not come very regularly until November 18th. During this interval a downy woodpecker also came to feed occasionally. November 18th a blue jay found the supply of suet, and soon became quite a regular feeder. These birds soon became accustomed to eat from the moving trough, as well as from the stationary one.

Knowing that the birds had already become acquainted with the moving trough, I took down the stationary one, and put a

trough at the window-sill. November 22nd I also moved the moving trough in a few inches. In a short time a brown creeper and several more blue jays came to feed.

I continued to move my moving trough from one to two feet each day, until on December 23d my trough was at the window, where the same birds continued to come.

When birds become accustomed to feed at the window sill, there is a possibility of having them become so tame that they will eat from your hand. Birds must not be approached too quickly, or they may become frightened. If the bird observer is quiet and very patient the birds will soon feed from his hand. Some people, perhaps, would be tempted to hold a tame bird by force, but by so doing the bird would probably be frightened away for good.

December 24th, while watching a number of chickadees feed, I held out my hand with some ground walnuts, hoping that some chickadee might see the food and eat from my hand. I had not long to wait, for several chickadees saw the food and ate. The next day was a joyous Christmas, for almost all the chickadees that came to feed ate out of my hand. The chickadees from that time on seemed very tame and would frequently eat from my hand.

The person trying to feed the birds must not be discouraged if they do not feed in mild weather. It is the hard winter weather that compels the birds to take food supplied by man.

My success did not begin until after the heavy snowstorm on January 17th and 18th. On the 19th, about a dozen chickadees, several brown creepers and downy woodpeckers came to feed at my moving trough, which I let out to the tree on several days after the storm. A flock of about fifteen juncos also came to feed upon crumbs on the ground.

A few days after the snowstorm a new visitor, a hermit thrush, came to feed on the crumbs with the juncos. This rare bird was gladly welcomed. I put up another feeding trough about three feet from the ground on a cedar tree not far away. Here before long the hungry thrush became accustomed to eat suet.

February 6th, the juncos and hermit thrush came to feed at the moving trough, the thrush eating suet, and the juncos sunflower seeds.

February 10th, all birds that had so far fed, came to the window

trough to feed. February 19th and 20th, several tree sparrows and white-throated sparrows came to feed on the ground with the juncos, but did not feed regularly.

March 2nd, several myrtle warblers, which were around the place, came to feed at the window trough. They ate suet and continued to feed for several weeks.

Some birds approach the trough differently than others. The nuthatch first views the trough from a tree, and then with his nasal "hank, hank," flies to the trough. The downy woodpecker comes quietly down a tree, and flies to the trough. Blue jays can be heard a long time before they come to the trough. They usually can be heard approaching by their noisy "jay, jay." The chickadees can be heard coming by their usual "chickadee-dee-dee." The brown creeper comes so quietly that his short visits are sometimes not noticed until he flies away. The hermit thrush came to the trough quietly. It would sit on some small twig, bobbing its tail up and down while looking at the trough. After giving its tail sufficient exercise, it would fly to the trough. The juncos would come to feed quite quietly, sometimes uttering their twittering notes. The myrtle warblers would also come to feed in a quiet manner. Different birds also feed differently, and prefer certain foods. All the birds that fed, except the juncos and the tree and white-throated sparrows, ate suet. The following diagram shows the kind of foods different birds ate, and the kind each preferred:

Birds.	*Food Eaten.*	*Food Preferred*
1. Brown creeper.	suet	suet.
2. Blue jay.	nuts, sunflower seeds, bread, suet.	nuts, seeds and suet.
3. Chickadee.	nuts, sunflower seeds, hemp seeds, crumbs, suet.	nuts andsunflower seeds.
4. Downy woodpecker.	suet.	suet.
5. Hermit thrush.	suet, crumbs.	suet.
6. Juncos.	crumbs, sunflower seeds.	crumbs.
7. Myrtle warbler.	suet.	suet.
8. White-breasted nuthatch.	same as chickadees.	same as chickadees.
9. Tree sparrow.	crumbs.	crumbs.
10. White-throated sparrows.	crumbs.	crumbs.

Chickadees and blue jays eat sun-flower seeds in a similar way. They fly to the trough, pick up a seed, and then fly to some

horizontal twig or limb. Here they hold it between their toes, and peck at it until the shell falls off. Then they eat the kernel piece by piece.

The nuthatches, when eating sun-flower seeds, fly to the trough, pick up a seed, and then fly to a tree trunk. They deposit the seed in a crevice in the bark, and start to peck at the shell with their heads downward. After the shell is broken apart, they eat the kernel piece by piece.

The downy woodpecker and brown creepers, which I have never seen eat anything but suet, fly to the trough and stay there until they have had enough, or until some other bird has frightened them away.

The blue jays when eating suet, fly to the trough and stay there till they have finished, unless another hungry jay happens to be around.

The juncos, when eating sun-flower seeds, will crack them wherever found. This they do by placing the seed between their bills. After the shell is cracked and has fallen to the ground, they swallow the kernel. It is amusing to watch juncos look for food on a slightly snow covered trough. The amusing part is that they scratch with both feet at once.

Tree trunk birds can be made to feed in their natural positions, by tacking a piece of suet on a tree trunk, fixed at the window. The nuthatches will feed with their heads downward, and without the support of the tail. A brown creeper and downy woodpecker will feed in an opposite position, supported by the tail, while the chickadees will peck at the suet in almost any position.

Beginning about March 17th, the birds gradually fed a fewer number of times each day, until about April 10th, when bird feeding for the season of 1906-1907 ceased. Although no more birds came to feed after that time, the hermit trush still continued to stay around the place.

On April 18th, a flock of hermit thrushes, on their way north, stopped in a neighboring wood for several days. After this flock left, I never saw my winter friend again.

DEVELOPMENT OF TOAD'S EGGS

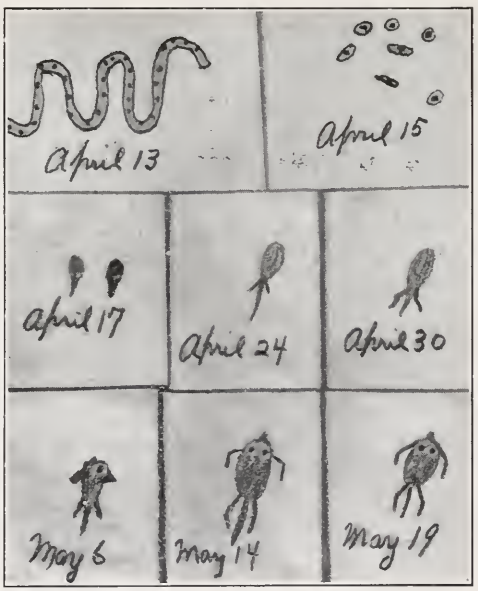
(A Second-Grade Study)

BY MARY A. DWYER
Washington School, Passaic, N. J.

Time: Three 15 minute periods per week, for seven weeks.

Material: One glass dish, two inches deep, eight inches long. About 35 toad's eggs.

Method: The first period was given to making ready our aquarium. Two large boys from the class were sent to a near-by pond, one to get a small pail of water the other to carry some pond gravel and a few large pebbles. These were placed in our dish. Lifting one string of eggs after another, so the class could see, the teacher placed the eggs in the dish or aquarium, as we called it after this. The last few minutes of the period were given to conversation between teacher and pupil, about the toads' eggs; as to size, color, number and manner in which they had been deposited by the, "mother toad."



Drawn by a second-grade pupil in Washington School, Passaic, N. J.

The second period was also a conversation lesson about the fully grown toad. Topics like the following will give some idea of the work covered: How many children have ever seen a toad? Where did you see him? What was he doing? How large was he? Of what color? How did he move about?

The third period was given to making our booklets, in which to record our observations from time to time (in lead pencil.) The date and drawing of the eggs in first stage was then placed in the booklet. Being II Grade this required much individual attention.

The second week we began our work of class observation and the recording of each observation. The method followed during this week, and until the close of our observation was: (1) The dish was placed on a low desk and the pupils, to slow march time, passed row after row around the dish until the entire class had had an opportunity to see the eggs in the aquarium. (2) The dish was replaced on its stand. The pupils were questioned as to any change in the eggs. The pupils who could not "tell" of a change, that is give a word picture, were given yellow crayon and sent to the blackboard to make a large drawing of what they saw. Several worked at the same time. (3) The drawings were compared with the eggs in the dish, and the less observing pupils were led to see the change. (4) Booklets were distributed and each child recorded his observation with the date. (5) The question "What story do we wish our picture to tell? led to the short sentence written under each recorded observation.

The pupils took pride in keeping neat and exact records. The interest was kept alive and the power of quick observation was strengthened. At the close of the study the booklets were exhibited, then taken home as treasures by each pupil.

AN EMBRYO WILD FLOWER GARDEN

BY MERCY A. PEARSON
State Model School, Trenton, N. J.

Last September "a wild flower garden" was found among the requirements in nature work for the fourth Primary grade. Owing to circumstances over which the teacher had no control, the plot for the garden was not available till too late to utilize for the autumn work. As early this spring as it was safe to be on the ground the class was taken to the garden to select the best site for wild flowers. Recalling places where they had found them, a shady corner, protected from the sun on the south by a large barn, and on the east by a high board fence, was chosen.

To hide the fence and make the surroundings more woodsy, seeds of the wild cucumber were planted. The boys spaded the ground while the girls placed the seeds. One pupil insisted that the point of the seeds be placed upward and the plant would come up sooner. That she might see her error seeds were placed in various positions between glass and blotting paper, the latter kept moist that the seeds might sprout. Thus the truth was reached.

A trip to the woods was next in order to procure stock. Before starting, the unnecessary uprooting of plants was emphasized. The destructiveness for which Americans are proverbial was commented on. A child exclaimed, "Oh yes, that is why Plymouth Rock had to be enclosed and guarded. If it hadn't been there wouldn't be any of it left."

The radius of the extinction of wild flowers increases about cities each year. Not a plot of ground is set apart for a public park but in a short time all the wild flowers disappear. Trentonians justly proud of Cadwalader Park can remember when innumerable jack-in-the-pulpits preached to large congregations there. But the young iconoclasts have torn down the pulpits and driven out the ministers till there is not one left to lift a warning finger to those who would desecrate the Holy Day by base ball. It is hoped that the planting and caring for wild

flowers will create so much love for and interest in them that the tendency to protect will take the place of that to destroy.

The Woman of Thought knowing "Satan finds mischief for idle hands" gave to each child a paper bag to fill with the wood's soil that the plants be insured against homesickness. In this first outing jack-in-the-pulpits, spring beauties, violets both white and blue, and ferns with their fronds still rolled were taken carefully from the ground and packed for the moving. As the outing took place on an afternoon the transplanting was done the following morning. The children who remembered to bring the bag of leaf mold to school that morning earned the privilege of going to the garden to assist, first, in selecting the part of the plot best suited to each plant, which they did after recalling its former location, then in breaking the soil, setting the plant, and firming the earth about it.

An interested friend found some orchids, the wild lady-slipper variety, which she donoted to the garden. After telling the children where she had found them, and of their environment they were suitably placed.

Only one more addition was made to the garden, that of a mass of roots of the star-of-Bethlehem.

The variety of roots, fibrous, creeping, corm and bulbous were noticed ; and the two kinds found in a single plant aroused speculation as to the function of each.

The necessity for keeping the plot damp was inferred by the children, and the task allotted to them. But the copious rains of May proved all that was needed, and at the close of the school year the transplanted wild flowers were as thrifty as though in their native woods.

So the first chapter of the wild flower garden is ended, the garden only just begun. But everything must have a beginning.

INDEPENDENT OBSERVATION

BY SARAH CONSIDINE
Grant School, Passaic, N. J.

Webster says, "Observation is an expression of an opinion or judgment upon what one has observed." Even the most trivial objects around us or the most unimportant events of life will convey education in some form if thoughtfully considered or observed. We all know that children are very keen observers and many of us have often heard the remark, "If you want to know all that is happening take a child with you as he always sees everything." Let a stranger enter your class room if only for a few minutes and then depart. The children if given a chance to express their opinion of the person, will surprise you with their cleverness of observation. We do not always give them credit for this keen sense which they possess.

In their nature work as in all other things there is very little but what they can tell you if given the opportunity to observe and report what they have seen. In our lessons on birds, trees and flowers where each child is given an opportunity to tell what he has observed, I tell the class several days ahead that on a certain day we shall talk on such a subject—say the chimney swift, the elm tree, or the violet, as the case may be. I tell them to be observing on this subject, to be able to report to the class what they have observed.

Always try to give each pupil an opportunity to say something and encourage those who hesitate or seem afraid to report. Supposing their observations are not always correct, do not make them feel as though they hadn't seen anything and in as many words or by your manner tell them so. Rather tell them that you do not agree with them, or did not see it as they did, and that you would like to have them look again and then tell you. As soon as the time can be taken, hear what they have to say. You will find they will come back eager to tell you what they have seen, and that this time their observation will be correct as they have been more careful.

If you have a class not especially observant, tell them at

first just what you wish them to note. Give one or two things so they will have ample opportunity to see and think about it. It is well for the teacher to know where the various subjects to be studied are found so as to direct her class where to look for them.

In studying a tree it would be well to tell the class to observe along these lines—where the tree grows, height (compare with a telegraph pole or an electric light pole,) how tall the trunk is before it begins to branch, in what direction the branches grow (upward, outward, or drooping), condition of the bark found on the trunk, color, compare with the bark of a twig, leaves if tree is in leaf.

I give the following as a type lesson which was given one day while we were studying the scarlet tanager. All these facts were given by the pupils after they had been told to observe the bird. "The scarlet tanager is quite a little larger than an English sparrow." "It is a red bird with black wings and tail." "It has a short beak." "It builds its nest in the oak or the pine tree." "Its nest is high in the tree." "Often times it is near a brook or stream where it can bathe." "I saw one in the water and I thought it was drowned, when I went to go near it flew away and I knew it was taking its bath." "Nest is somewhat like a robin's." "It is made of mud, sticks and straw." "Eggs are bluish-green and there are three or four in the nest." "This bird does not come so very near to the house." "It is shy." "It flits from tree to tree." "It has a voice somewhat like a robin's."

Children who can use their observation powers and get such facts as the above do not need a book.

How much more we could enjoy the beauties around us if our powers of observation had been trained. As we realize this, it seems to us a pleasant task to help our pupils to gain what we have missed. And for this reason subjects for nature-study should not be difficult to find. Despise not small things; everything around us is of some importance and can be used to advantage.

PRACTICAL EXPERIMENTS IN THE SCHOOLROOM

By M. LOUISE VAN NOSTRAND
Lafayette School, Passaic

All work done by pupils, 6th grade.

First experiment: To show that water rises in soil and to compare soils in their power to absorb and retain moisture. Two glass tumblers were filled; one with rich soil, the other with sand. A piece of muslin was tied over each, each tumbler then weighed one pound. They were inverted in saucers containing water. At the end of three days they each were heavier in weight, proving that the water had risen. For several days the tumblers were left on the window-sill and then by the use of the scales the sand was found to have lost much more water than the rich soil. So after a rain water not only sinks into the soil, but rises again and this is of great value to plants. With house-plants it is well to keep water in the saucers so the water will rise through the roots to the entire plant. As rich soil retains moisture the longest, it is better to plant most of our seeds in that.

Second experiment: To show how moisture can be kept in the soil. Two tumblers were filled with the same kind of moist soil and their weight was the same. One tumbler was then left untouched. The soil in the other tumbler every night and morning was loosened for a depth of about three-fourths of an inch. After several days the weight of the tumblers showed that the one whose soil was loosened twice daily retained more moisture. Thus it was proved that to keep a garden well watered hoeing must often take place. In other words, the soil must be cultivated to keep in the water.

Third experiment: To show air relation of soils. Two tumblers were filled with rich soil and peas were planted in each. One tumbler was kept moderately moist, while the other had the soil covered with water all the time. A fine healthy plant was soon thriving in the soil which was kept moderately moist, while in the tumbler where the soil was saturated the seeds rotted. So water acts like a blanket, keeping out air as well as sunshine, and plants cannot grow without air.

Fourth experiment: To show whether plants as well as animals breathe, giving out carbonic acid gas. Lime water was poured into a glass, and upon blowing through a glass tube the lime water became milky. Now, would plants have the same effect upon lime water? Peas were soaked over night and a glass quart jar was half filled with them. On the top of peas was placed a small glass containing lime water and the cover of the glass jar was screwed on. In less than an hour the lime water presented a milky appearance. Plants breathe the same as human beings, giving out carbonic acid gas.

Each pupil kept a record of the experiments performed, one of which reports is given below.

Report on Experiments, by Elsie M. Long, VI grade

We put soil in a glass and turned it upside down in a saucer of water and left it there for a week. When we took it up, the water was all through the soil; this proves that water rises in soil. In one glass we put sand and moistened it and in the other glass soil. They each weighed one pound. When we took and weighed them the next week the soil weighed more so it shows water evaporates quicker in sand than in soil.

We put water in a glass of soil and kept it loosened for three-fourths of an inch. The other one we did not loosen at all. The one we loosened, weighed more so it proves the soil keeps water longer when it is loosened than when it is kept hard.

A farmer should keep his soil loose as it keeps it much nicer looking. It keeps more moisture and keeps it much longer.

REPORT ON LESSONS IN SCHOOL-GARDENS AT MONTCLAIR

[The following report is given as an example of the way in which the records of the school-garden work are kept in some of the Montclair schools. A printed blank is used for reports of teachers. G. H. T.]

Chestnut St. School Report of Field Work

Subject: School-Gardens.

Special Topic: Planting.

Preparation of Teacher: (a) In the Field. (b) Literature. [No report in this case.]

Preparation of Class: Calculation of the amount of fertilizer necessary for a garden, 4x8 if an acre takes one ton. Directions as to the depth of planting and illustrative planting on the desks.

Place Visited: The gardens on Fullerton Avenue.

Work done in the field and time occupied: The gardens were marked into fifteen rows with the markers and the seeds planted—the radishes and lettuce about a quarter-inch apart and the onions about two inches apart. The seeds were lightly covered and the earth trodden over them. Last of all the fertilizer was sprinkled over the gardens. (It was late in arriving.) One hour.

Review in class-room and time occupied: Review on May first consisted of a discussion of the whole garden and a written paper concerning the whole subject. Time two hours.

Remarks: [Blank in this case.]

Name of teacher: Marion Terhune. *Grade* VI. *Date*, May 1, 1908.

AMERICAN NATURE-STUDY SOCIETY

The annual meeting of the Society will be held in Baltimore, in affiliation with the American Association for the Advancement of Science, December 28 to 31. The exact dates of meetings and subjects will be announced in the November issue of THE REVIEW. It is probable that one session will be devoted to nature-study and elementary agriculture, and another to nature-study as related to high-school biology. Members of the Society who can use printed matter concerning the A. N. S. S., may obtain such from the secretary (525 W. 120 St., New York).

THE
NATURE-STUDY REVIEW

DEVOTED TO ALL PHASES OF NATURE-STUDY IN SCHOOLS

VOL. 4 NOVEMBER, 1908 No. 8

AMERICAN NATURE-STUDY SOCIETY

Announcement of Annual Meeting

The annual meeting of the American Nature-Study Society will be held in Baltimore on December 29th and 30th. There will be two sessions (at 9 or 9.30 A. M., Tuesday and Wednesday, December 29th and 30th) and a business meeting at 5 o'clock on the 29th. The program of the American Association for the Advancement of Science will be distributed at Baltimore and should be consulted for final announcements regarding exact hours and places of the meetings of the A. N. S. S. The meetings will probably be held at the Eastern Female High School.

Members of the A. N. S. S. will be able to take advantage of whatever reduced rates are granted to the American Association for the Advancement of Science. It is probable that the rate will be about one and three-fifths fares for the round trip on the certificate plan. Consult local ticket agents.

It has been decided by the Council that one session will be devoted to a discussion of "The Relation of Nature-Study and Agriculture in Elementary Rural Schools," and one session to "The Relation of Nature-Study and High School Science." A number of well known educators will open these discussions with *short* papers, and there will be much time for general discussion. These are timely topics, and they ought to result in meetings as interesting and profitable as was the meeting at Chicago last January and the one at Cleveland last July.

The secretary of the A. N. S. S. calls attention to the fact that, in order to mail THE NATURE-STUDY REVIEW for 1909 to members, it is necessary that annual dues be paid not later than January. Payment before January will save the Society con-

siderable expense in dealing with the records. It is suggested that as far as convenient the fee ($1.00) for 1909 be mailed in envelope containing sealed ballot (see nominations on another page) for 1909 officers of the A. N. S. S.

Nominations for Officers of A. N. S. S. for 1909

In accordance with provisions of the constitution, the Council submits the following nominations for officers to be elected at a business meeting of the A. N. S. S. to be held in Baltimore, in the room assigned for the regular sessions, at 5 P. M., Tuesday, December 29, 1908. The constitution provides that other nominations signed by twenty-five members shall be added to those made by the Council, but no such nominations have been received by the secretary.

Members who do not plan to go to Baltimore may mail their ballots to the secretary of the Society, and in accordance with the constitution all ballots received before December 25th will be counted with those voted at the annual meeting. Ballots mailed to the Secretary should be enclosed in sealed envelopes marked "For officers 1909, A. N. S. S." They must be signed by members voting. A printed ballot is enclosed in the advertising pages of this issue of THE REVIEW, but a written one will be legal.

It will be noted that there are more names printed below than there are officers to be elected. This results from (1) that all these names received a decided majority in a vote of the Council taken by mail, but there were several tie votes; and (2) it seems desirable to present a ticket which allows all members to participate in the election. In other words it is important that the A. N. S. S. should guard against the Council becoming self-perpetuating by having its nominations for officers become tantamount to election. It is to be hoped that next year members of the Society outside the Council will make the selection of officers more democratic by presenting nominations signed by 25 or more members as provided for in the constitution.

To the great regret of the members of the Council President Bailey finds that great pressure of duties connected with the Country Life Commission makes it impossible for him to accept any office in the A. N. S. S. for the coming year.

(*Blank ticket for use in voting, is printed on advertising page 2.*)

For *President:* C. F. Hodge, Clark University, Worcester, Mass.

For *Vice-Presidents:* (Vote for *five* only): O. W. Caldwell, School of Education, The University of Chicago; V. L. Kellogg, Stanford University, California; F. L. Charles, DeKalb (Ill.) Normal School; F. L. Stevens, College of A. and M. A., Raleigh, N. C.; W. Lochhead, Macdonald College, Quebec; B. M. Davis, Miami University, Ohio; W. A. Baldwin, Hyannis (Mass.) Normal School.

For *Directors* (Vote for *five* only): G. H. Trafton, Supervisor of Nature-Study, Passaic, N. J.; F. L. Holtz, Brooklyn (N. Y.) Training School; John Dearness (London, Canada) Normal School; F. L. Clements, University of Minnesota; E. R. Downing, Marquette (Mich.) Normal School; A. B. Graham, College of Agriculture, Ohio State University; J. W. Shepherd, Chicago Normal School; Anna Botsford Comstock, Cornell University; S. B. McCready, Macdonald Institute, Guelph, Canada; Ruth Marshall, Milwaukee High School.

The secretary and five directors (Crosby, Mann, Coulter, Fairbanks and Guyer) were elected last January to serve two years.

For list of 1908 officers consult THE REVIEW for January of this year. It is also given on back cover pages of most issues.

Concerning Organizing Sections of the A. N. S. S.

The secretary again calls the attention of members to that article of the constitution which provides for sections of the Society in any city, State, group of States, or province of Canada. According to the constitution it is not necessary to have 100 members, except in order to elect a delegate to the Council of the national organization. The Council will approve an application for establishing a section by twenty-five or more members of the A. N. S. S. In addition there may be any number of associate members of the section who are enrolled only in the section. This arrangement is entirely in harmony with the constitution, and provides for those who do not care to be members of the national organization, receive THE REVIEW, and pay the regular fee of $1 per year. It is probable that many associate members of local sections will later become regular members of the A. N. S. S. At any rate there is an advantage to the work of the A. N. S. S. in that those most likely to be associate members are teachers who must deal with local nature-study problems.

There is no provision in the organization of the A. N. S. S. for financing sections. The income from the membership fee ($1.00) is just sufficient with 1000 members to pay for free copies of THE REVIEW, postage on correspondence, special printing and expenses of national meetings. Until the membership reaches 1500 to 1800 members stenographic and clerical work, costing $250 a year, must be paid by the Secretary from entirely private sources. Under such conditions it is obvious that the small expenses of local sections must be met by local contributions and fees of associate members. However, the question of local expenses is easily solved when the situation is explained to members.

More Members Needed

Again the secretary begs to call attention to the need of more members (1) in order to increase the influence of the Society and (2) in order to provide funds for the work. For the latter reason alone it is important that the membership list be raised to 1500 or other plans devised for providing an annual income of $1500. Just how that $1500 is needed will be shown in detail by the 1908 report of the Secretary to be published after the annual meeting. We have not reached the 1000 mark in paid memberships. We have a large number of applications *not yet paid*. Perhaps it was expecting too much that a society organized in January should have 1000 members in full standing by November. At the rate of which new members have enrolled during the past month the Society will easily reach 1200 early in 1909; but we want 1500.

It is reported that the National Geographical Society has thousands of members paying a fee of $2 per year. Of course that society reaches far outside of educational circles; but the American Nature-Study Society might do likewise to some extent. We have now a large number of members who enrolled as "citizens interested in elementary education." We need many more such members and we can get them interested if several hundred members will cooperate with the officers in calling attention to the aims of the A. N. S. S.

Suggestions regarding membership of the Society will be gladly welcomed by the secretary. Especially does the secretary want names of teachers and others who might be interested in the

A. N. S. S. If you can distribute small circulars concerning the A. N. S. S., please inform the secretary as to number you can use.

New York City Section of American Nature-Study Society

A joint meeting of this Section and of the School-Garden Association of New York will be held at Public School No. 165 on Friday, December fourth at 8 P. M. The meeting will be devoted to papers on and discussion of the relation of local school-gardens to nature-study in the New York City schools. This is the second of a series of meetings planned to make a survey of existing conditions and practice of nature-study teaching in the public schools of Greater New York.

Communications regarding the New York City Section should be addressed to Mrs. Alice R. Northrop, chairman, 500 Warburton Ave., Yonkers, N. Y.

American Association for the Advancement of Science

Since the above was set in type, the preliminary announcement of this society has been mailed to members. It should be in the hands of all members of the American Nature-Study Society who think of going to Baltimore. Write direct to Dr. L. O. Howard, Washington, D. C.

During the year 1908, members of various scientific societies are being enrolled in the A. A. A. S. without payment of the usual admission fee of $5.00. It seems probable that members of the A. N. S. S. might be included in this arrangement, and the secretary will be glad to present any application to the officers of the A. A. A. S. The fee in that society is $3.00 per year, which includes the weekly journal *Science*.

NATURE COURSES AND SCIENCE COURSES

By W. F. GANONG
Professor of Botany, Smith College

Among the many who are watching the progress of the nature-study movement represented by the American Nature-Study Society and The Nature-Study Review, there is no person who views it with greater sympathy and appreciation than the writer of these lines. Accordingly it is with very deep regret that I observe among some of its advocates a tendency not only to disparage but even to condemn the elementary science courses as given by our colleges and high schools. Were the criticism specific and well-grounded it would be welcome; but in fact it is vague, uncharitable and unjust, and I desire to enter an emphatic protest against it.

The disparagement of which I speak seems to have been growing of late, and it has reached its extreme in the paper by Professor Hodge in the September number of this journal. But Professor Hodge's article has this marked merit, that it is not simply destructive, but is also constructive, for he outlines a substitute for the scientific courses which he condemns. Now, I maintain that the usual scientific courses, where even only passably given, are vastly superior to his proposed substitute in three of the most fundamental features. First, they are practicable of educational administration, while his is impossible of such administration; second, the information they impart is worth far more to the great majority of students than that involved in his course; third, they give an intellectual training far superior.

I can assume, I think, that Professor Hodge's suggested elementary biological course for colleges and high schools is accessible to my readers in their copies of the September Review, and I need only recall that he groups the subjects under some four heads thus:—"a few things of vital import to the life of the child and the home"; a few things that every decent member of a community ought to know about the forces of living nature;" "health, individual and civic, is the paramount interest;" "conservation of natural resources." Professor Hodge then proceeds to give certain illustrative problems of the field, which are as follows:

Seasons of flowering and ripening seeds in about 40 of our most important forest, nut and ornamental trees; together with methods of saving, storing and planting the seeds and rearing the trees.
Function of forestry in controlling water flow and washing of soil.
Outlawed weeds and poisonous plants.
Native weeds in danger of extermination.
Common ferns.
Elementary agriculture and horticulture.
Common mushrooms, edible and poisonous.
Common parasitic fungi, blights, smuts, rusts, mildews, locally important forms.
Insects, life-histories and natural enemies of about 151 [probably a misprint for 150] most important species.
Economic status and foods of about 100 birds.
Common amphibia, natural history and value as destroyers of insects.
Important fresh-water fishes, food, spawning seasons and habitats.

Every teacher of the usual scientific courses knows that a number of the topics in the above list, notably some of those relating to hygiene, actually do find a place in their courses. But as to the remainder, including the great majority, I maintain that they are at present wholly impossible of profitable teaching in the elementary courses of the schools and colleges of this country. If our classes consisted of a very few pupils all eager to learn (that ideal pupil which Professor Hodge, and especially that arch-optimist of us all, Professor L. H. Bailey, seem to have exclusively in mind in their writings and addresses), and if they all lived in places easily accessible to the country, and if they could give well-nigh unlimited time to their biological studies, and if they worked in the summer when the birds and the plants are active, then indeed Professor Hodge's course might come within the range of practicability. But, what are, in fact, the conditions under which we must actually work? They are these: solid blocks, often several of them, of thirty or more students—a few of them interested, the majority indifferent, and some incapable of any effective teaching, but all of whom must be kept constantly busy,—in most cases working in the city with the country inaccessibly remote, able to give but a few scattered hours per week to the work, and in session only during the winter months with a little of the spring and fall. Now, if the reader will once more look at Professor Hodge's course with these conditions in mind, I think he will agree with me that the whole scheme is simply impossible, the more especially as Professor Hodge would himself be the first and most strenuous in insisting that his list of field topices must be studied in the field and not in the laboratory. On the other hand our scientific courses in college and

high school are administrable—they are adapted to large numbers and various grades of students, to city schools, to a winter session; and further I maintain that where even only passably taught, they are doing much good, sitmulating the interested to higher work, giving the indifferent some uplift, and keeping the mediocre at least busily occupied. Our college and high school courses are adapted to a condition, Professor Hodge's to a theory.

So much for the practicability of Professor Hodge's course. But I maintain further that even if his were practicable it would be inferior educationally to the scientific courses as commonly taught. The educational value of a course consists in two things, the information imparted and the training given. I place information first because Professor Hodge lays practically his whole stress upon it. Now, remembering that several of the topics in his course are already treated in our biological courses, I will ask my readers who are teachers to compare the knowledge-value of the subjects in Professor Hodge's list with those in the usual scientific courses, remembering also the all-essential point that the vast majority of our students are to dwell in cities, and will have a contact with nature that is general and not specific. I maintain that for all such people a knowledge of the way in which a seed unfolds and develops into a mature flowering and fruiting plant, even if the facts are seen only in pots and boxes in a laboratory, is much more worth while than a knowledge of the "Economic status and foods of about 100 birds;" that a knowledge of the construction of plants and animals from tissues and cells is worth more than that of the "Important fresh-water fishes, food, spawning habits and habitats;" that a knowledge of the significance of the green color of vegetation to plants, the animals and man, is worth more than that of the "common amphibia, natural history and value as destroyers of insects;" and so on through most of the list. In fact most of the topics studied in our scientific courses illuminate a wide circle of phenomena beyond their own limits, and are such as are likely to interest men and women no matter what their future residence or occupation may be, while Professor Hodge's topics for the most part have not that merit. On the other hand, I admit that some of the topics in his list should receive more attention in our courses than they do, e.g., relations of forestry to the public good. But the trouble is that most of these subjects are not yet organized

for practicable utilization in our courses, and they ought not to be generally introduced until they are thus worked out. And just here in my opinion lies a rich field for educational endeavor in the immediate future—the organization of important economic topics for practicable educational use; and I regard the two pages of Professor Bigelow's "Organization of Nature-Study Lessons" in the September REVIEW as exactly in this line and worth many pages of indefinite criticism and untested suggestions.

I have left for the last the most important matter of all, that of training. To this Professor Hodge gives little attention and no emphasis, but it is that for which the scientific courses pre-eminently stand. The practical impossibility of teaching most of our students through field work would make it necessary that most of Professor Hodge's topics be taught from books, (supplemented of course by diagrams, stuffed specimens, etc.), and his course must necessarily resolve itself, in the great majority of cases, into a book-and-memory study of nature. Thus he would eliminate from the course the one great distinctive feature which science courses have to offer to education, *viz.*, that training, upon the basis of personal contact with original phenomena, in the correlated use of hand, eye and mind. This training has the great educational merit that its benefits are not confined alone to the subject in which it is acquired but can be felt in any occupation the student may later take up. The results in the case of our science courses are not very striking it is true, for we have our students too short a time to make any great impression upon them; but that impression is nevertheless real and lasting as far as it goes and wholly in a good direction. And we are to do better in the future. Some of the nature-study advocates, and notably Professor Bailey (in the September REVIEW), maintain that the science courses lay too much stress upon training in accuracy of detail, and not enough upon training in generalizations. From this view I wholly dissent, for in my opinion there is no training which the American youth needs more than that in a power to be accurate in details. Carelessness as to particulars and a tendency towards easy generalities is a chief fault in the American character, and one against which our educational institutions ought to set themselves, even if they must, to use Professor Hodge's expression, "withdraw still farther from the main currents of American life." I do not understand that it is a

duty of our educational institutions to take note of the tendencies of American life, and then rush in with a grand hurrah to lead the mob, yet this is not an unnatural inference from Professor Hodge's remarks. It is the function of college and school to give stability to those elements of American life which are virtues, and strenuously to resist those which are faults. That training in accuracy in particulars is a great problem of American education at the present day is vividly brought out in the Declaration of the National Education Association at Cleveland in July last,* a document which every American teacher should thoroughly know, and I commend to my readers' attention a comparison of the articles of Professor Bailey and Professor Hodge with paragraphs 1, 2, 5, 14 of that Declaration. Upon such a comparison I am willing to rest my case.

In a word, with all the burden of their faults, I maintain that the tolerably-taught scientific elementary courses of college and high school are not only educationally of high value but are incomparably superior to any of the substitutes which have yet, in the name of nature-study, been offered for them. There are two ways in this world in which we can surpass our competitors. One is to rise by merit above them, and the other is to push them down. I hope in their efforts to advance their interests, the nature-study advocates will rely upon the first of these.

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*Published in *Science* 28, 333.

METHODS IN NATURE-STUDY

By L. S. HAWKINS
State Normal School, Cortland, N. Y.

What particular material to use in nature-study work will always be an open question. The great diversity in conditions makes the problem a different one for each teacher. Equipment, time, weather, and locality, all variables, enter into its solution. Most nature-study teachers agree upon the general character of the material. Concerning the treatment of that material there is great diversity of opinion. That is to say, nearly all agree that animals, plants, or rocks serve equally well for material; the question most discussed is whether the children should be asked to classify these materials, either naturally or artificially, or to consider them in relation to their environment, or to dissect them and study the structure, or to treat them in some similar manner. If we think for a moment, we will see that these questions and all similar ones can be discussed intelligently only after the solution of the fundamental question of how our nature-study is to be taught. In other words, the real problem of nature-study is, how can we state our method so that the results will be independent of the material.

If we carefully examine the accepted aims of nature-study, we will find that most of them contain the idea that the purpose of nature-study is to train the child to ask and answer for himself questions about nature. Asking questions is natural to the child. Answering these spontaneous questions usually necessitates a separation of the main question into several subordinate questions which are more easily answered. Early in life the child learns the relationship of cause and effect. An effect is often present to suggest a question concerning the why. Thus we find the question, "What makes it do so?" This usually is an excellent foundation for suggestion of related questions to which there may be found an answer. Thus if a boy sees a magic egg which persists in standing on end, the question immediately comes into his head, if not to his lips, "What makes it do that?" At that moment he can not answer the question. The teacher has three ways of answering: (1) explanation by word of mouth; (2) explanation by a series of experiments illustrating the center

of gravity; (3) assistance given the boy in planning a series of experiments which will enable him to answer the question for himself. There is quite general agreement in favor of the third method.

This brings us to a consideration of the factors concerned in the method of solution of a problem. Prof. DeGarmo says; "There are at least three plainly marked stages in all educational methods that aspire to scientific completeness. (1) The acquisition of facts by means of authority, observation, or experiment. (2) The determination of the meaning of these facts through the process of reasoning. (3) The development of efficiency in the use of the knowledge so acquired." Our nature-study methods have thus far been based on the first of these stages and attempts have been made to bridge over from this one to the third stage without sufficient consideration of the second. (Incidentally the main discussion concerning the first stage has been centered around the method of securing the facts to the neglect of the question, what facts are needed.) The present status of the nature-study question indicates that we shall find the second stage the foundation on which to build our method.

The capability of the student should determine the problem. It must be within his range and still not so easy that the answer is self evident. Once the problem is set, there is a definite aim toward which the accumulation of facts is to point. These facts are then acquired with some idea of their immediate use.

In the determination of the meaning of these facts through some process of reasoning, we find two general methods of procedure. The teacher may carefully explain some general law or principle and, after showing its meaning, lead the student to apply that law or principle to the problem in hand. (A deductive method). On the other hand he may lead the student to observe the facts, relate them to other experiences, and formulate a general idea. (An inductive process). The several phases of these two methods include the possibilities of method. It is here that the problem of nature-study rests. The method must be progressive along the line of setting and solving problems of nature that constantly appear in the experience of the child. Mere acquisition of facts in any manner whatsoever can never demand more than passing recognition.

NATURE-STUDY IN CITY AND RURAL SCHOOLS

By E. EARL DUBOIS
Ogdensburg, N. Y.

Now that the nature-study movement has become recognized as a permanent factor in education, many of the agricultural colleges which have done so much to promote it are beginning to devote their efforts more and more to purely agricultural subjects and topics related directly to farm life. I believe, most firmly, in the teaching of agriculture in the rural common schools because the farmer, more than anyone else, needs a knowledge of the subjects related to his life-work and, as so few of them go to any other school, where else can they obtain it. I do believe, however, in the teaching of nature-study in all public schools in city and country alike—nature-study that will interest the child in his surroundings and broaden his outlook upon life, whether those surroundings be those of a farm or of a city. In other words, is agriculture, nature-study? To the farm boy, it is; to the city child it is science.

During the past winter I have been watching the work of a class of about 30 girls who comprise a teacher's training class in a high school. All of them, excepting one or two, have always lived in a city and know but little about farm life. The nature-study syllabus which they are attempting to follow requires such subjects as stock feeding, rotation of crops, fertilizers, insect pests and general farm and dairy management. Knowing nothing about farm life and not having yet become familiar with the principles underlying farm work, this class of girls cannot understand or appreciate these subjects and when they begin to teach they will either neglect nature-study altogether or do what might be worse, attempt to teach it in a wrong way. If this same class had been required to study only those things which were near at hand, things more closely related to their own lives, the simple facts of plant growth and nutrition, the work of the trees and the life history of common birds and animals, could all be learned naturally and they would learn *how* to study nature. Then if later on they are called to teach in rural schools their study will have provided them with a key to their new surroundings and they will meet the problems of the farm in quite a different spirit.

The agricultural colleges are issuing publications on agriculture in the schools. The state syllabii are requiring agriculture. Where are the teachers in cities and villages to get their material for nature-study work on subjects of direct interest to the pupils. Would we not have better agricultural education if we had more nature-study in the earlier grades? The great aim of nature-study is to give the child or the man a simple observational knowledge of the objects with which his daily life is surrounded in order to put his life in harmony with the forces at work around him. This is best accomplished by using subjects near at hand in which the child has a natural interest. If he is forced to study something in which he has no spontaneous interest, the object of nature-study will be defeated.

I believe that all our schools, both rural and urban, should teach nature-study in the first five or six grades with freedom enough so that any subject to which the different children are attracted may be used. The work for the more advanced grades should be divided so that the rural school may teach agriculture, dairying or whatever it needs and the city school may teach elementary natural sciences, school gardening, or any subject which may be of direct interest to the students. If the same subjects are used for both in the higher grades, neither one can attain to the fullest success. It seems to me to be time that we had better nature-study materials for the city schools.

In the conference on Agricultural Education this morning, Dean Williams, of the State Normal College at Athens, Ohio, made the statement that every graduate of that institution is required to teach nature-study. The point appears to be that method in successful nature-study, involving outdoor work, garden studies, etc., is sufficiently a method of its own to justify such requirement. It would be difficult to find a teacher of nature-study in disagreement with this proposition, but I know of no other normal school which, under the pressure of other demands upon the student within the two-year course, has found it practicable to make this work required of all graduates.

CORRESPONDENCE AND DISCUSSIONS

Training Teachers of Nature-Study. The impression that nature-study is one thing and elementary agriculture another appears to need checking. A recent bulletin of our State University contains the folllowing paragraph:

"For several years instruction that may properly be called agricultural, though it certainly is not agriculture, has been given under the titles Nature-Study and School-Gardens. The trouble with this work is that it fails to connect with any serious business of life. There is a wide breach left here between the life in school and the life beyond the school. Many people have the impression that Nature-Study and School-Garden work are what is meant by school agriculture. They are not."

That such distinction is unfortunate goes without saying here. Is it not surprising if the Nature-Study Society and the leaders in elementary agriculture find themselves at cross purposes in any degree whatsoever? Yet perhaps the instance cited attracts attention more through its singularity than through evidence it affords of any very general sentiment, though we have evidence that such sentiment is not uncommon among schoolmasters in Illinois.

Surely criticism of nature-study as "failing to connect with any serious business of life" finds no more plausible basis than instances of nature-study badly taught. Is it not desirable that every effort be made to prevent in popular conception any such divorce of ideas as is indicated in the paragraph quoted? Surely it will work injury to what should be a common cause.

[Professor JOHN G. COULTER, Illinois State Normal University, at the Conference of the American Nature-Study Society, at Cleveland, July 2.]

Passenger Pigeons. While tending my birds this morning, a flock of 30 to 40, what I believe to be passenger pigeons flew over my head. It was about 6 A. M. and they flew almost due west. The morning was a little misty—real pigeon weather—and they were flying so low—within thirty feet of me—that my attention was called to them by the loud rush of wings. Mourning doves are out of the question here, and the only other possibility is a compact flight of blue homing pigeons; but I have seen no such flock of homers before. I am familiar with homing pigeons and do not think they flock or fly quite like the wild bird. At the

instant I had no doubts, but on thinking the matter over, I find that I am not quite so sure as if I had been able to make out the individual birds a little more sharply. I had but an instananeous retinal "snap shot" as they disappeared over the low tops of the apple trees close by, and before I looked up they had swept over my head and were flying almost straight away up the hill beyond. The size and shape of the birds, the sound as of water over the slashboards of a dam, the flock formation, and, most of all, the clean, straight, swift rush are all so characteristic and unmistakable that I feel fully warranted in making this report. I hunted the birds and was very familiar with them in Wisconsin up to 1882.

We may hope for other reports; but very few know the bird in this section, fewer appreciate the significance, and fewer still would report even if they saw and knew. Almost all who have studied the matter consider the wild pigeon totally extinct. If stray flocks, or even pairs can be located, the whole continent should be aroused to accord them absolute protection to feed and breed. In this way we may even yet mitigate the national disgrace of having exterminated the finest race of pigeons the world has produced.

Worcester, Mass., C. F. HODGE.
Sept. 25, 1908.

The Point of View. In THE NATURE-STUDY REVIEW for September so many voices have spoken that it is difficult to get the "dangling ends" together in a strand by which to hold oneself. "Nature-study, it must take the things next at hand. . . It sees the important thing to do and does it. . . . Schools seem to lack motive power, do not train in leadership. They are static, and do not seem able to send pupils out to take hold of the first things." (Squeers did that much for his young people—"They went and did it.")

What does the author mean by "first things." He explains that certain subjects "develop no power or desire to put pupils to work *in city improvement societies, civic organizations, Farmers' Clubs*, or other *homely* and *common, necessary work* for the *community*." These are the "first things," are they? Some may not agree with the author, and be inclined to regard these the *last things* in which one could expect children of grade-school

age to take spontaneous and natural interest. I go farther: Some may think these the *last things* in which children *should* take interest. It is true that we have had them: "Bands of Mercy," "Mosquito Leagues," "Paper-Picking Associations," *et al.*; and we may yet have a "Childrens' Smoke Consuming Crusade." If it were not so serious from the standpoint of time, economy, and taxes, one might laugh at it, take hold of "*the thing next at hand*" and forget it all. Besides, what of the effect of it all, on the children? What effect on mind and heart of the millions of children has the advocated "free natural and direct educational process." For, although it must be "accurate, in detail, yet it must furnish point of view, and vigor of personal initiative."

In reading much of this, I ask myself continually: Is this all for children of the grade schools? Must they seem to imitate all sorts of civic concerns—and solve all sorts of sociological probblems?. It is to me a strange phenomenon and one having little good, this shifting upon children the responsibility of delivering us from evil, while permitting at large adults who violate by overt acts all laws of decency. We wonder at the fanaticism of the middle ages, and stand aghast at the sacrifice of innocents led forth to exterminate the moslem hordes, and yet demand of our own babies that they shall do battle for us—for us grown-ups—so that birds shall not be slaughtered for vanity, mosquitoes not spread disease, our streets not be polluted, our forests not be destroyed, our soil not wasted, our courts not be conniving, our votes not be bought and sold, our cows not fed on slop, and our men not get drunk. And, note now the logical indictment: "So long as our public school does not turn out children who *can* and *do* imitate these measures, so long it stands self condemned as a useless institution that ought to be summarily dealt with. Therefore, go too now, ye teachers (some of you 'no doubt' are lax and lazy)—I say, go too now, and do raise radishes or anything else that makes for a "center of interest." Let go reading, writing and the inculcation of obedience to authority. Let every thing be free and natural, and get initiative in children.

Let us look at this thing again. Children are children. As such they are in the objective stage of mentality. Much like an animal—they *see* the thing, but lack power to trace it to its

course, or to see its direct relations to other things. With this in mind, we cannot present to them problems involving such indirect relations without seriously interfering with the spontaneous activity that naturally characterizes creatures in that objective stage of intellectual development. They *can* do much, they *can be made* to do much, they *must* do many things of *a certain kind* which, if they do not do in childhood cannot be done for them, or by them at all. They can learn facts, but not philosophy of facts, nor interpret facts. The facts of nature, they can learn, can learn *systematically*; and if they do so learn them, it will become fruitful knowledge to them when experience of riper years shall have given them interpretive power. I emphasize *systematically* to call attention to the different counsel given by many who advocate "free and natural processes," regardless of the fact that no colt by any such process ever became an efficient horse. Harnesses and traces and systems, and hard and fast lines for beginners, and out of that, at length, comes initiative, and spontaneity, and grace, and movement, and results that count. I cannot see it any other way.

Hughes High School, MAXIMILIAN BRAAM.
Cincinnati, Ohio.

The Relation of Agriculture to Science. In a recent issue of the *School News*, Dean Davenport of the Illinois College of Agriculture says that "when I speak of teaching *agriculture* in our high schools, I mean *agriculture*. I do not mean nature-study nor do I mean that some sort of a pedagogical kink should be given even to geography and arithmetic. Let agriculture introduce new matter into the schools and with it a new point of view." It is certainly difficult to understand what all this means, because agriculture is certainly only an application of the principles of the various sciences. A splendid illustration is found in the same number of the same magazine in an article by Professor Barto, also of the Illinois College of Agriculture. This article discusses how water is held in the soil and the sub-topics are texture of soils, pore space, the relation of pore space to weight of soil, the importance of careful tilth in order to give the open porous texture of a fertile soil, the difficulty of handling clay soil because of the fineness of the grains of the particles, the capacity for water depends upon pore space, and the forms of soil water and control of soil

waters. In fact, from beginning to end this excellent article is nothing more or less than a "pedagogical kink" given to chemistry and physics with special reference to soils considered as a basis for plant growth. This is good agriculture, and apparently good agricultural teaching, but it certainly is not "introducing new matter." Every one of the important points in this article are perfectly familiar to thousands of students who have followed courses in physics which did not contain the words "soil" and "agriculture." In short, this lesson in agriculture is simply the old material of physics and chemistry from the point of view of agriculture. Perhaps this is "new," but it is obvious that there is nothing to be gained and much to be lost if we continue to insist that this new subject in the school curriculum is new matter and not simply an educational application to special problems of matter and methods which are familiar in the various sciences. The above illustration shows that the agricultural teaching is after all a sort of a "pedagogical kink" (the writer would prefer to describe it as an *educational application*) of physics, chemistry and biology. This being the case we can certainly make headway by working towards a proper correlation with the existing courses in the sciences, rather than by trying to establish the absurd claim that agricultural instruction is an *entirely new subject* which ought to be kept quite independent of the regular science courses.

M. A. BIGELOW.

Will Agricultural Teaching Keep Boys on the Farm? One of the most striking characteristics in the numerous arguments advanced in favor of agricultural instruction for public schools is the statement that if properly educated with reference to the agricultural business, boys will tend to stay on the farm. This idea that somehow nature-study and agricultural teaching will tend to keep the boys on the farm and prevent migration to the cities has become widespread throughout the land and at the present time it is the greatest motive power back of the movement for agricultural education in many States.

Looking at the facts verified by observation in a large number of concrete cases, the writer is led to question whether it is safe to base our agricultural instruction on the theory that it will tend to keep the boys on the farm. I doubt it because I know that a large number of boys do not leave farms because they find it

uninteresting, even without special agricultural instruction, but simply because the economic conditions are such that a very large number of boys, no matter what their education may be, must look to the cities for their life work. The following case will illustrate my meaning:

A well-known professor has for years owned a farm and his family has spent most of the time there. The four sons are intensely interested in agriculture and so far as interest is concerned there is no question about all of them giving great promise of becoming successful farmers. The writer was talking with this professor the other day and learned that one of the sons, the eldest, is taking an agricultural course and the father has deliberately steered the other sons into the regular course of the college of arts and science. As an explanation of this, Professor ——— made essentially the following statement: "I am financially in a position to start one of my sons in business as a farmer, because I can let him use my farm which will make it possible for him to get an annual income of from $1,600 to $2,000 a year. But having done this, for my eldest son, I can not start any of the three other sons in the farming business. I am convinced that the day is past when an educated young man can see a hopeful outlook in farming without capital with which to begin. I know that by giving these other three sons a classical or scientific education I can prepare them for professional or business life which will make it possible for them to make an annual income perhaps even better than can be made by the one son who remains on the farm." It is clear that this case is one of applied economics; but no doubt some enthusiastic believer in the all-sufficiency of agricultural education will come along some fifteen or twenty years hence and say that if the sons of Professor ——— had had nature-study and agricultural education when they were boys, they would all have become successful farmers. Obviously it is not true. The economic conditions will inevitably force the majority of the sons of the average successful farmers into the cities.

Another case is that of a farmer with an investment of about $20,000 in farm and equipment. With that investment he has been able to make during his active life an income of from $1,400 to $1,800 a year. That farm with its equipment is sufficient to provide profitable work for one of the three sons during the father's lifetime. This was foreseen. Two sons were given a

college education at a State university at an average cost of $1,200 each. Now, after ten years, these sons who went to a city to enter business and professions have an average annual income above $2,500 as a result of an investment of $1,200 in education for city life. In short, this farmer has been able to give only one son capital for farming; and in order to give the other sons a fair chance, his best opportunity was in the line of education for professional or business life in cities. It is another clear case where economics has forced the solution of the problem. So far as interest in agriculture is concerned, either one of these sons now in the city would compare very favorably as to their interest in country life with most of the authors who write interesting articles about agricultural education keeping boys on the farm.

It must be evident to any one who seriously considers similar facts, verified from an extensive acquaintance in farming communities, that it will not be safe to arrange all our agricultural education with reference to keeping boys on the farm. It will not apply except to the very smallest families, because the financial situation will force an economic outlet to the cities. These being the facts which must be faced, it is obviously unwise to plan the work in agricultural education entirely with reference to practical application. So far as concerns the boy who remains on the farm, it may be all very well for him to serve an apprenticeship in agriculture while he is in the public schools. So far as such boys are concerned there may be some value in learning the details concerning such practical things as insecticides, fertilizers and testing butter fat and similar things which are abundant in current courses of agriculture; but how about such things for the majority of boys who must enter professions or business simply because they can not have the capital for engaging in agriculture? It seems very questionable whether serving an apprenticeship in agriculture under the guise of school work is the best thing for such individuals. This leads one to question whether it must not sooner or later be recognized that the best kind of instruction in agriculture designed for all pupils in the public schools of the rural communities will be that which deals with the great principles and the great ideas, leaving for special apprentice work (elective for those who plan to go directly to the farms) the technical things such as are of very little interest except to those who are actually going to put them into practice.

M. A. BIGELOW.

BOOK NOTES

Elementary Agriculture. A complaint is often heard that the current texts are so general as to lack force in a given locality where specific agricultural industries are prominent. The recent text by Ferguson and Lewis (Ferguson Pub. Co., Sherman, Texas) is avowedly written for the Southwest, and the most casual examination leaves no doubt on this point. The best and most vital, in the sense of being most related to the environment, that there is in physiography, botany, and zoology, are here brought together, and the reader is not permitted to forget that it is real science, and not nature-study. Herein lies the merit or weakness of the work according to the use made of it. The theory of variation and crossing is thoroughly but plainly treated, but not apart from its application. For that matter hardly a page lacks evidence of the direct bearing of the facts of the sciences on agriculture. One almost wonders why some expansion of the work here outlined would not allow it profitably to supplant any formal presentation of one or two of the usual high-school sciences. The treatment of subject-matter is less uneven than in many texts. Most of it is more difficult than some parts of other texts, and none of it quite so difficult as some parts of most texts written ostensibly for the grades. There is too much taking for granted of chemical knowledge which not two children in a county possess. Most of the plant physiology is within the grasp of seventh-and eighth-grade children, but much of the morphology is hopelessly beyond them. The lack of laboratory directions would be amply supplied by Bulletins 186, and 195, of the Office of Experiment Stations, Department of Agriculture. The text is one of the best yet written for children of first year high school age. Much of it involves knowledge which even teachers of the rural common schools do not have.

Montclair, N. J., Normal School C. H. Robison.

American Birds. By William L. Finley. New York: Scribners. 1907. $1.50.

This book is a series of studies with note-book and camera of the life-history of about twenty-five common birds. It is not a reference book, but simply a collection of readable essays, illustrated by a large number of good photographs from life.

Romance of the Reaper. By Herbert N. Casson. New York: Doubleday, Page. 1908. $1.00.

The story of the invention and manufacture of harvesting machines. Reads like an Arabian Night's tale, and deserves to be required reading in every class in agriculture.

Indiana Arbor and Bird Day Annual. This excellent pamphlet from the office of the State Superintendent of Public Instruction is especially interesting because more than twenty pages were contributed by the pupils of the School for Feeble-Minded Youth at Fort Wayne. Principal Cyrus D. Mead of the school is an enthusiastic believer in nature-study and its correlations.

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NATURE AND THE OTHER SUBJECTS OF INSTRUCTION

By FRANCIS G. BLAIR

Superintendent of Public Instruction, State of Illinois

Nature-study as a thing in itself has had its ups and downs, its ins and outs in the programme of instruction. At times, heralded by loud trumpets, headed by mounted police, it has forced the other subjects back to the fences in order to make for itself a big open space on the highway of learning, but before the dust of its coming had fairly settled the older subjects closed in upon it and trampled it under foot. Today it spreads its tents and unfurls its banners; tomorrow nothing remains but the litter and the muss of the encampment. One superintendent drags it in and another drags it out. Coming and going, but rarely abiding. Some teachers love it, some hate it and others preserve an armed neutrality.

This, with some exaggeration, is the story of nature-study as a special study in the programme of the common schools of Illinois. But it is not all of the story. Neither the success or the failure of the great nature-study movement depends upon its having a special and a permanent abiding place upon the daily programme. Its spirit, its method, its point of view, are its great gifts, its lasting contribution to the common-school curriculum. Here the nature-study leaders have done their great work. They have practically re-created the other subjects of study. They have given them a concrete, tangible basis. The old geography with

its first question, "What is the earth?" and with its ready-made answer, "The earth is a great globe revolving in space," has given place to the new with its first statement, "Children, you have often played in the dirt." That's bringing the earth down from the rarefied regions of mature speculation and placing it under the finger tips of the child! All the so-called natural sciences which, sewed and bound in "fourteen weeks" doses, were quite apart from nature and all that is natural, have felt the thrill of this nature-study life along their keel. Work in reading and literature, in history and mathematics have responded to the levening influence of this lump of nature-study. Books and apparatus, sand-tables and museums, aquariums and window-boxes, excursions and experimental farming, this is the path and the course of events along which and through which the nature-study spirit has lead the old time course of study. If the mountain could not be brought into the schoolroom to Mahomet, nature-study made one for him in the sand-table. If Mahomet could not go to the mountain his teacher took him to a near-by hill.

While the text-book, the picture, the model, and the stuffed specimen are the friends and allies of the nature-study spirit, they are but its reserve batteries planted within the fort,—its outposts are in the fields, along the streams, among the trees. It has converted field, forest and stream into a laboratory, a demonstration room. It has made the school a part of the life that is. It has not only put "tongues in trees, books in the running brooks, sermons in stones," but it has put trees in the tongues of the children, running brooks in their reading books, and the story of the stones into the choicest sermons.

When primitive man went into a school to get the interpretation of a book he did well, but when the book of symbols began to close for him the book of nature it was not well. Each book has its place and that place is close beside the other. The nature-study movement has done its great work in placing these two books closer together and in filling them both fuller of meaning.

RECENT ASPECTS OF THE NATURE-STUDY MOVEMENT

By EUGENE DAVENPORT

Dean of College of Agriculture and Director of Agricultural Experiment Station, University of Illinois

Nature-study in its various forms and with all its successes and failures, with its advantages and its short-comings, ought to be regarded, it seems to me, as one of the many attempts of educators to connect the school with the real things of life. The world has changed much since the old days when the scholar attempted, first of all, to withdraw from the world and free himself from mundane facts and influences that his mind might dwell in a world of idealism. We have also gotten beyond the stage when it was believed that the greatest study of mankind is man, and we are now trying to study man in his relations not only to his Creator and to other men, but to his own activities and to other created things.

The first effect of nature-study was doubtless to cultivate the powers of observation, to attract attention to things close by, to lead the student to realize vividly how information is secured and how books are made. All this would be worth while even if it led to nothing better but, like all new movements, it rapidly developed into something of deeper consequence than the original effort.

I believe the time is coming when we should construe nature-study in the broadest possible terms: that we should understand it to mean not merely the observation of things going on outside of us and our affairs, but that it should also include those phases of nature activity which especially concern us, and in which we, ourselves, are able to take a hand and exert influence.

It seems to me it is this phase of the matter which accounts for the great interest in the developing of the study of agriculture. This element of personal influence is a strong one in the education of the child. It is the powerful element lending interest to the study of household science, art, manual training and industrial subjects generally, and when it is exerted upon living things, as it is in agriculture, it cannot help but appeal to the interest of the student and exert a peculiar usefulness in his education.

If now we add to this matter of nature contact and personal influence the idea of *producing* something, as we do in agriculture, we have then awakened the three strongest impulses of which the ambitious student is capable; his observing powers, his ability to exert controlling influences over the processes of nature, and in the end to really produce something that had no existence before.

The average teacher can have little conception of the natural impulses of the masses of the people in the direction of production, nor can she have a full comprehension of the importance of this impulse in a people such as ours. The great problem which faces 99 people out of 100, or which ought to face them, is how to make a living, that is, how to produce enough to meet the expenses of their food, clothing and shelter, which are the three great physical requirements of civilization. If we are to have a system of universal education, meaning by that a system that is to apply to all people, then it must touch them at this point, first of all, because it is a fundamental requirement that all must meet, or ought to meet, before they are ready for higher things or are entitled to possess them.

Education, therefore, is no escape from this fundamental obligation that rests upon all of us, and we are not to ignore this obligation nor forget its presence by failing to mention it in polite society. It would be funny, were it not pathetic, to contemplate the eager earnestness with which a certain type of so-called educated people worship the intellectual, and profess to regard the commercial and physical things of life as sordid and mean, when the largest of all the problems of life which they themselves live in common with the rest of us, is to meet the balance at the end of the month with the butcher, the baker, and the candlestick maker.

All this means, it seems to me, that we have developed the matter of nature-study until it has reached the field of agriculture; in other words, that it has come into contact with this great throbbing necessity of ours to take a hand in the affairs of nature and thereby earn our living. This form of nature-study is especially valuable, it seems to me, because it serves us well as an introduction to real life afterwards. Not only the information that is secured but the impulses that are engendered are all in the right direction, and a person trained through such experience not only possesses a larger stock of knowledge than the one who has

relied entirely upon books, but he has learned, in the meantime, how to put his knowledge to account; how to impress himself upon his surroundings, and how, in a large share, to meet the issues of life as they come.

Nor will the influence of this study be to lower the purely intellectual side of life nor to lessen the artistic perception of the student. No man can appreciate art when his stomach yearns for a good dinner. No more can he have high and notable thoughts except when he is well sheltered and clean. As the first business of an individual is to feed, clothe and shelter himself, and afterward to develop his higher faculties to his utmost, so is the business of the educator to instill early those fundamental qualities that will enable the students to meet these ordinary issues of life as a matter of training or habit, with some surplus energy left over for the other things. There is no more pitiful object than the person who has been trained in everything else except to be useful, and then pitched headlong into the whirlpool of ordinary affairs without chart, rudder or compass.

The hopeful thing, it seems to me, is that such a large proportion of our educators are coming to realize the meaning of this modern movement, especially in the teaching of agriculture. The impulse did not begin with the educators. It began with the people. But the best of the teachers were quick to see its significance and its possibilities, and they are exerting wonderful energy in meeting the new conditions which are really revolutionizing our ideals and our methods of instruction.

In this connection, I would emphasize the need of clear perception as to the real purpose in view when we teach agriculture or any other form of nature-study in our public schools. It is one thing to teach this subject for the general educational effect which is certainly pronounced upon all classes of students; it is quite another and different thing to teach it for the professional bearing upon the business of farming. I am one who believes that every school situated within reach of agricultural environment should do both things, even though the *individual student will need* but the one; that is to say, certain phases of agriculture, as they can be taught, especially in a good high school, are a valuable means of education for any man, whatever his later occupation may be. But if that school is situated in a farming community, it should add many other courses for professional

reasons, which would be valuable chiefly, if not exclusively, to those who look forward to farming as a business.

It may be a violent stretching of the term nature-study to apply it to technical instruction in agriculture, and yet I am thoroughly satisfied that the impulse that gave rise to this form of instruction culminates in this very thing. It is well to study the grasshopper, but I believe it is better to study the grass. It is well to study the frog, but I believe it is better to study the horse and the cow, the pig and the sheep. There is no plant known to botany more significant in its histological and physiological aspects than is Indian corn, which has the added advantage of a deep significance to our social and economic welfare. In other words, when we are studying corn, we are studying ourselves and our interests as well, and in this we have a practical example of the large fact that we learn more by inference, even in school, than we do by the direct method.

The importance of all this, it seems to me, and the matter of chief concern at this time, is that teachers pretty generally realize the full meaning of this modern movement which is expressing itself in various ways from the simplest form of nature-study up to the more complicated one which is agriculture. If we are to stop with observation simply, the movement will mean little, and will come to an end, because its full fruition has been prevented. But if we look upon the observation form of nature-study as suited to children, they begin there and expand the field and intensify the problems as the child grows, then we shall have a form of nature-study that will be effective in the schools, and tremendously efficient in turning out resourceful men. Regarded in this light, nature-study should free itself from the merely curious and interesting at the earlier stages of child development and undertake its study in a more serious aspect during those years of adolescence when the boy, especially, is bent on doing big things. That is a natural impulse that ought to be recognized and developed through careful education lest it dwindle with the years and die out, leaving the possessor to swell the ranks of the learned incompetents.

A SCHOOLROOM STUDY OF A ROBIN'S NEST

By JESSIE REBECCA MANN

Assistant in Biology, Northern Illinois State Normal School, De Kalb, Ill.

[Two robin nests on window sills—one in May and one in June—were under observation by classes in this institution last Spring. It is believed that the most complete data on record were obtained. This article deals with the pedagogical aspects of the study of the June brood. The record of the May brood is being prepared by Miss Mann and the undersigned and will probably appear soon in *Bird-Lore*. If all nature-study were so real—so rich in content and in interest, as was this, the problem would be well-nigh solved.—F.L.C.]

Our campus at the Northern Illinois State Normal School with its grove, stream, pond and meadow gives us most unusual facilities for the field study of birds. It is owing partly to this fact and partly to the intrinsic interest of the subject that the bird course is perhaps the most popular one given in the science department. Last spring we had an opportunity to study the home life and nesting habits of one bird, the robin; to put more reality into the laboratory work; to understand the relation between structure and function so admirably exemplified in the birds' body and to come into close sympathy with bird-life as never before.

It came about in this way. Late in April a pair of robins was discovered building a nest on the sill of a second-story window of the Normal building and the class had the pleasure of watching the rearing of the brood. Complete all-day records were kept for five days in which everything that happened in or about the nest was carefully recorded.

Just before the close of the term a second nest was discovered, also on a window sill, but in another part of the building. The young birds, three in number, were three days old when our summer term opened, June 22, 1908.

At the first recitation the class was taken to see the nest and young birds. The vine-framed window stood wide open and the teacher gently lifed one of the nestlings from the nest so that it might be better seen. As we stood there the mother came with her bill full of wriggling earthworms which she dropped into the gaping yellow mouths of the young in the nest. The interest of the class was at once aroused in the operation and many ques-

tions were asked. "How many times a day are they fed?" "Does the father help in the feeding?" "What kinds of food do the parents bring?" "How long before they will fly?"

Robin's nest on the sill of a vine-framed window of a schoolroom.

These questions gave us a starting point. Here were problems which had arisen in a perfectly natural way. How should they be solved? Of course, the only way would be by careful and constant observations. We discussed the value of making such observations; what others had done on the same or similar problems, and decided that the undertaking was well worth while.

As the room was unoccupied at the time and furnished with desks, the class decided to move in and live as much as possible with the birds. The observations necessary to solve the prob-

lems naturally took the form of those made on the previous nest. Sheets of paper were prepared, ruled with columns for each set of observations to be made: 1. The number of the feeding for that day. 2. Time of the feeding. 3. The parent bringing the food. 4. The kind of food. 5. The number of pieces of food brought. 6. The nestling fed. 7. Remarks: any behavior of parents or nestlings.

We decided to make complete all-day observations for six days, three of the days to be at once while the birds were small and three just before we might expect them to leave the nest. The observations had to begin at daylight, about 3:50 A.M., and continue until the birds had settled for the night. We prepared a regular schedule and each student observed and recorded for an hour and never left until the one who was to relieve him was seated at the window and ready to begin work. The window was open and the observer sat so near that at any time he could put out his hand and touch the nest. The mother soon became accustomed to our presence and was rarely disturbed by it unless an unusual or quick movement was made; then, if absent, she as a rule immediately reappeared ready for protest and defense. We soon learned that the young birds were half orphans—the dead body of the male being found upon the ground near the nest—and that all the care and feeding would necessarily devolve upon the mother. This made conditions somewhat unnatural, and life at the nest was less varied and interesting than it had been with the May brood when both parents took part in the duties. But the constant activity and the devotion of the bird mother were something to be long remembered.

The nestlings were marked on the bill with inks of different colors and designated as Nos. 1, 2 and 3. Each morning any interesting change in appearance or any unusual behavior of the young birds was reported to the class. One day it was that No. 3 had opened its eyes; on another day that No. 1 had flapped its wings as if trying to fly or that No. 2 had stood on the edge of the nest. Every day at recitation time the little ones were carefully placed in a bowl lined with cotton wool and weighed on a platform balance. Their weight was recorded and the gain during twenty-four hours ascertained and compared with that of the previous day, together with the amount of food taken during the period. Some interesting and unexpected relations were dis-

covered. Later a graph was made which showed these relations in a very striking way.

One of the first things done was to sketch a young bird in dorsal view, indicating the location of down and of the dark streaks where feathers soon began to appear—the feather tracts. Sketches were also made of the head showing the eyes, the ears and the character of the bill as compared with that of the adult bird. Even the fact that birds have ears was new to some members of the class.

The leg and foot were examined and the parts compared with the parts of the human leg and foot. Every one interpreted the ankle joint as the knee. To correct this misconception a study of the frame work of the leg was made from chicken bones (collected from the remains of clubhouse Sunday dinners) carefully cleaned and mounted in position upon cardboard. These leg-skeletons were compared with drawings of corresponding parts in the human skeleton and we discovered that a bird stands upon its toes and that "its heel is well up the leg."

We also noticed the little bare wing, the end of which much resembled a tiny mitten with hand and thumb. The framework of the wing was studied in the same manner as the leg and its parts compared with those of the human arm. We found that the little mitten really covered a hand with two fingers and a thumb. Drawings of both leg and wing skeleton were made and fully labeled.

By this time, when the birds were six days old, the feathers (still in their sheaths), had become conspicuous and gave the explanation of the dark streaks down the head and back and on the wings. The natal down, the only covering at first, was plainly seen to be growing out from the skin attached to the end of the new feather. In a few hours, at the end of the sheath and still bearing its little shred of down, appeared the vane of the feather, very much resembling a tiny camel's hair brush, the sheath forming the handle.

Now was the opportune time for studying the structure and development of the feather. Sketches were made and labeled as laboratory work; the minute structures were studied under the microscope, explained and sketched on the blackboard until the relation of barb, barbule and barbicel was clear and the nice adaptation of this wonderful structure—a feather—was seen in

quill and vane, in form and material. The development of the feather is a difficult subject and it was presented by the teacher and illustrated by means of blackboard sketches and simply constructed paper models.

We next studied the wing itself, noticing the mother as she came and went folding and spreading her wings and rising or alighting. Primaries, secondaries, and coverts were now easily distinguishable on the wings of the young birds. Wings of pigeons (or chickens), prepared and spread upon cardboard mounts were studied concerning the arrangement of the feathers. Here again we sought the adaptations.

But the wing alone does not tell the story of the bird's power of flight. The whole body is built so as to secure the greatest strength with the least weight. Pigeons were used for demonstrating the air sacs and the relation of these to the lungs and to respiration. The trachea and syrinx were noted and also the large pectoral muscles by means of which the wings are moved We also found and worked the automatic device of bone and tendon that makes the act of perching and clasping a branch so simple and so sure. We sketched the viscera in position and learned the work of each part of the alimentary canal in preparing the food which must furnish the energy for all the activities of bird-life.

The amount of food consumed increased as the birds grew larger but the actual gain in weight steadily decreased. There was an actual loss in weight on two days when feather formation was very active and the question, Why? came up for discussion. The difference in the kinds of food brought to the May brood and to the June brood was interesting. The former received a considerable variety; earthworms, ants, beetles, small moths, flies and various insect larvæ, among which were injurious cut-worms. The June brood was fed almost entirely upon earthworms. Here again we sought the reason. In this connection we took up briefly the economic value of birds, especially at the nesting season, as destroyers of injurious insects. We referred to the work of other observers of nestling birds and compared their work and results with ours.

By the tenth day the nest had become quite crowded and as the birds were active, moving about and clambering over each other continually, No. 3 had the misfortune to fall from the nest

to the ground, where he was picked up dead. This was a real grief to the class but it helped—with the death of the father bird—to show us how the balance of nature is maintained and why the number of birds and other animals in a given locality does not increase from year to year unless some disturbing factor enters in.

One warm, bright morning in July when the young birds were thirteen days old they hopped from the bowl when we attempted to weigh them and refused to stay when replaced. When put into the nest they at once tried their wings for a longer flight. With the cry, "They're gone!" the whole class crowded about the empty nest on the sill and watched the progress of the two little adventurers across the lawn. All that day different members of the class followed their course up and down the terraces and among the shrubbery until the two birdlings put their heads under their wings beneath a honeysuckle bush for their first night out in the big, strange world.

The birds were gone. What had they left with us beside the memory of their interesting ways and a series of accurate records? As we think over the work which was certainly a delight to teacher and to students we can summarize our gains:

1. We had gained some idea of scientific methods of observation and a greater respect for careful, painstaking effort in all lines of work.

2. We had learned to make careful and accurate records, to record only what we actually saw,—*to tell the truth.*

3. We had learned that seemingly insignificant details may be of great value in solving a problem—to tell the whole truth.

4. We had a first-hand knowledge of bird-life in its most interesting phase and had accumulated a number of valuable facts.

5. We had gained these facts not in a perfunctory way but by solving problems of our own which we felt to be worth while.

6. By having the birds growing and developing before us we were able to see a vital relation between structure and function which is often missed in the usual laboratory study of an organism. (This amount of work could not be done in ten days' time with one recitation a day. In the summer term our classes recite twice a day in a major subject.)

7. We had, in short, studied birds instead of studying about them. We had gained a broad and intelligent sympathy with bird life and with all life a—sense of kinship with our humble

brothers of the field and wood, and we must be better nature-study teachers for it. Every bird song will be more meaningful and every nest more sacred because we have known the home life of one bird—our robin on the window sill.

THE JOHN SWANEY SCHOOL

By VICTOR C. KAYS
Magnolia, Ill.

NOTE.—Nine years ago a farmer lad from Putnam County, Ill., enrolled as a student in one of the state normal schools of Illinois. Graduating in 1902, after teaching biology for two years in a township high school he entered the state university. Returning to the farm, he joined vigorously in a campaign then waging for the consolidation of three one-room country schools of the neighborhood. Eventually a $12,000 two story building was erected upon a large and picturesque campus. This young man was elected to membership on the Board of Directors and has been closely identified with the enterprise in all its details. Upon request he has prepared the following paper for this number of THE REVIEW. Through the efforts of such as he the rural school will take form and the country child will come into his own.—F. L. C.]

The "John Swaney Consolidated School," is in Putnam County, Illinois. This school is in the country, planned and built by country people for the education of country children. Three ordinary sized school districts have been merged into one large district. It is a little difficult to think over the events which led to this culmination and select any one thing which made this plan of consolidation appeal to the people of this community more than any other; but probably the offer of Capt. John Swaney, a veteran of the Civil War, to deed to the new district, if such were formed, twenty-four acres of land as a building site lent impetus to the slowly gathering movement. In 1905 a majority of the voters in the area under consideration were not in favor of the proposition, but in 1906 the sentiment had changed and 79% of the voters signed petitions favoring the proposal. With this overwhelming majority in favor of the step, a suitable building of brick was soon erected, courses of study planned and teachers procured.

The element that was in the minority here was largely composed of non-resident land owners, childless land owners and tenants influenced by landlords that were opposed to the scheme. These people urged as reasons for opposing the plan: excessive and burdensome taxes, the illegality of using school funds to pay

for the transportation of children to and from school, and the impossibility of such transportation on account of the bad roads of the neighborhood. Of these three reasons two have been shown to be false; 79% of the patrons declare that they are getting full value for every cent expended; for two years the hacks have made their daily trips, thereby disproving another contention; and at the present time there is a suit in the courts testing the legality of spending school funds for the transportation of pupils to and from school.

The school-building is a two-story brick structure which contains rooms for the grades and high school as well as two laboratories, manual training room, gymnasium, boiler and playrooms, dressing rooms, closets, etc. It is heated with steam, lighted throughout by gas, has a water-pressure system and power for machinery in the work shop. The laboratories are fitted for biology and agriculture and for chemistry and physics.

The nature-study is carried on throughout the grades, and special emphasis is laid on that which pertains to the farmer. As illustrations of this we find the children emphasizing the work on noxious weeds; study being directed toward the life-history, the seed and its dissemination as well as the eradication of the plant. In their study of trees, aside from the identification, the superficial characteristics, etc., the boys and girls go into the characteristics of the wood and its uses on the farm. In the bird work a study is made of the interrelation existing between the birds and trees, birds and insects, birds and the farm crops, —both direct influence and their indirect influences. In their study of insect life in this work special attention is called to the life-history and characteristics of those insects which are of economic value or are a detriment to the farmers, as the cut-worm, wire-worm, white grub and corn-root aphis, all of which are the commonest of insect pests. These are some of the problems which the boys and girls are working upon.

In the high school four years of agriculture and the same amount of domestic science is offered. During the freshman year one semester of agronomy and one semester of horticulture is offered. The agronomy work covers the identification of the seed of noxious weeds and a study of the habits of each plant. Each student makes collections of these seeds and note-books are required. The selection and judging of seed corn is also studied. Contests in selection and in judging are carried on.

The John Swaney Consolidated School in Putnam Co., Ill.—In the country, built by country people, for country children.

The horticulture consists in orchard work, spraying, pruning, layering, grafting, budding, orchard pests and means of combating them, and the selection of fruit. There is a young orchard on the campus and the classes do the work necessary to keep it in ideal condition.

During the second year one-half semester's work in animal husbandry is given. It consists of a study of the market classes and grades of swine. Bulletins issued by the University of Illinois and the daily stock journals are used as texts and the stock of neighboring farmers are used for laboratory practice. The people wish their boys to be able not only to identify the ideal type of animal but also to read and intelligently interpret their market reports and thereby be able to determine accurately the correct value of their own property.

During the third year the first semester is devoted to agronomy consisting of a study of the physical characteristics of the different soils. Experimental work is carried on for the determination of specific gravity, water holding capacity of the soil, capillarity and the mechanical analysis of soil. A study of the effects of the various farming operations on the soil is made, including plowing, harrowing, rolling, etc.

The animal husbandry work of this year during the first half of the second semester consists of a study of the principles of feeding. The boys study the activities of the animal body and the products of its metabolism. The foods are considered as meat, milk or wool producers as well as energy and heat producers. The art of feeding for a specific purpose is studied, and since these boys' fathers are always feeding for some one of these purposes the students take a great deal of interest in this kind of work.

During the second half of this semester the judging of the market classes and grades of beef cattle is taken up. The same practices are in use in this course as in the swine course, that is, neighboring farmers' stock is used for laboratory practice and the same classification is used that is found in the leading live-stock markets of the country. When practicable, classes are taken to fairs to score and judge stock that they may compare their work with that of the expert.

During the senior year a course is given in soil fertility. In this course chemical analyses are made of various soils, fertilizers,

etc. The different systems of farming are studied as well as crop rotation, succession, cropping, fertilization, soil renewal, etc. Bulletins of the University of Illinois and of the U. S. Department of Agriculture are a great aid in this work.

Aside from the agriculture work above described, this high school presents enough work to obtain full entrance credit at the State University.

This school has been in successful operation for two years. The pupils like it and the parents believe in it. The patrons help in each forward movement and the school is truly the center of the community life. The larger district makes a larger communal life and enables the country people to obtain for themselves better literary and social advantages. The idea of this community seems to be to present to their children such courses that they may be educated to gain a livelihood, that they may enjoy this livelihood to its fullest extent, and that they may appreciate in their rural surroundings all of the beauties and blessings of nature. For after all, our thoughts are the measure of things and the value of the days and the sun and rain and soil lies in what we think and how we think it. Hence this little school among the farmers to lead the boys and girls to true manhood and true womanhood. If by its influence these boys and girls become the school children of nature, then these people will be satisfied that they have indeed done well.

WINDOW GARDENS

By FRANK K. BALTHIS
De Kalb, Ill.

The successful cultivation of plants in the ordinary dwelling or schoolroom may be anticipated if care is exercised in procuring proper soils, judicious watering, the selection of suitable varieties and a congenial situation where light and heat may be regulated. Then, too, the natural habits and requirements of the plants should be learned, if not already known, by consulting any of the excellent works on gardening (Bailey's "Cyclopedia of American Horticulture," Nicholson's "Dictionary of Gardening," Henderson's Manual of Plants.") This could well be correlated with the study of geography. For example, we find that the common geranium came originally from South Africa. It delights in bright sunshine, and in a firm, clayey soil. Again, the common rubber plant was found in the rich, damp forests of Tropical Asia. It requires a soil rich in humus and an abundance of water during the growing season. Turning to the Western Hemisphere, we find that practically all of the cacti are indigenous to the arid regions of Mexico. Therefore, we should secure a sandy soil for cacti and water only occasionally when at rest, which is during the fall and winter months.

It must be borne in mind that all plants have a growing and a resting season, and will not grow continuously. In the geranium, for example, to secure an abundance of bloom during the winter, cuttings ("slips") should be made in late July or early August. Old plants that have bloomed during the summer require severe pruning if lifted in the fall, but even then will be inferior to those propagated during the summer.

Air and Light. The dry atmosphere usually found in the schoolroom is troublesome, but by a careful selection of varieties the difficulty may be reduced to a minimum. Some plants will endure dense shade, but all the light possible should be given. A south window is the best for all plants, but when such a location is unavailable only those plants possessing leathery leaves, or leaves with small stomata, should be selected. Some of the

tropical plants, the rubber plant, the palm, cacti and English ivy are good examples. Frequent syringing removes dust and allows uninterrupted transpiration. Any device for promoting moisture about the plants is beneficial. Potted plants may be placed in shallow zinc lined boxes partially filled with moss—sphagnum moss is excellent; this keeps the roots cool and moist and is sufficiently loose to enable the air to enter. The kitchen is sometimes designated "The Plant Hospital," because the steam and vapors rising promote a moist atmosphere. Gas and kerosene stoves or lamps are very injurious to all plant life,especially ferns.

Soil. Owing to the fact that the roots of potted plants are confined to a small area it is necessary to secure good soil. The best plan is to procure a supply from the local florist, otherwise one can make a suitable soil. Sod taken from a vacant lot or pasture land that is free of weeds, cut into convenient lengths for handling, stacked in piles in any out-of-the-way place with the turf side down and allowed to stand for about six months will be ready for use. By adding about one-third of well rotted cow manure the soil will be greatly enriched.

Sod soils are full of fibre, which indicates a condition of great porosity, and permits the unhindered circulation of air. A small quantity of sand should be added to the soil and thoroughly mixed. The addition of sand keeps the soil from packing and permits the free passage of water. Small pieces of charcoal added are beneficial in that it keeps the soil pure and sweet. Leaf mould added to the sod soil is the best for plants with fibrous or thread-like roots, such as ferns. A good proportion of leaf mould to soil is one to three. To procure a supply of leaf mould, save all the fallen leaves instead of burning, as is usually done; pile them in a pit, dry goods box, or frame exposed to the weather and allowed to stand for about a year. By forking over and watering occasionally decomposition is hastened.

Lessons in soils and soil making should be given whenever practical. Various combinations should be tried and results noted by the pupils.

Potting. The kind and the size of pot used must be given some consideration. A good standard clay pot is very porous and requires more water than a glazed pot. To grow plants successfully do not paint the pots, as all pores are stopped up and the

free circulation of air prevented. When potting, the soil should be moist, not wet, and never dry. If dry add a little water and mix well until in the proper condition. Avoid over potting (using too large a pot and too much soil) else the danger of over watering is increased. A good plan is to plant all plants in pots about one inch larger than the size of the root system. To secure perfect drainage cover the hole at the bottom of the pot with a piece of broken pot, brick, a few small stones, or a little moss. If potting geraniums, rubber plants, palms or plants of a similar nature, firm the soil about the roots with the fingers, or with large plants use a stick. For small plants the soil should be sifted through a fine meshed sieve to remove all lumps. Soil for large plants need not be sifted, but all large lumps should be crushed or thrown out. The operation of potting plants that are easily handled is quite simple. Place the pot on the table or bench in front and cover the hole in the bottom for drainage. Then with the left hand place the plant in the center of the pot, and with the right hand fill partially with soil and firm. The left hand may assist the right in filling and firming as soon as sufficient soil has been added to steady the plant. Do not fill the pot completely as space must be left for water and do not plant too deep. Plants taken up in the fall should be potted, watered and set in a cool, shady place until the roots have begun to grow, after which they may be placed in their permanent positions. Practically all newly lifted plants exhibit a tendency to wilt and it is easy to over water when in that condition.

Interesting experiments may be conducted with newly potted plants. For instance, take a geranium, cut back the top to within four to six inches of the ground, cut the roots back correspondingly, pot in a pot of suitable size and water slightly at first, then keep dry. Watch the result. Again, take a geranium, do not prune at all, pot in a large pot and water thoroughly every day. What happens and why? The same principle would hold in practically all cases.

Watering is the most important detail in plant culture. No definite rule can be given, but a safe method is to *water only when needed and then thoroughly.* When to water may be readily ascertained by simply thumping the side of the pot. If the sound produced is hollow, it is time to water. Each plant must be considered as an individual and should be examined every day

and watered accordingly. Care must be exercised in watering plants in small pots as they dry and very rapidly. Seedlings should be given close attention at all times to avoid over watering and subsequent loss from "damping off." "Damping off" is a fungous growth caused by over watering. Plants grown in window boxes require less water than those grown in pots as the area of the soil is greater and it does not dry out so rapidly. Potted plants growing in jardiniers should be removed when watered and allowed to drain. When in a shady situation plants require less water than when in direct sunlight. Plants in a dormant condition need not be watered, though the soil should not be dust dry, else the stems will shrivel away. Keep dormant plants in the cellar with the temperature at about forty degrees. When watering hanging baskets set them in a tub or bucket of water, they may then be thoroughly soaked. Unhealthy, or sick plants are greatly benefited by withholding water until they have regained their vigor. The temperature of the surrounding atmosphere must be considered when watering. Less water will be required when plants are grown in a comparatively low temperature, as evaporation is then slower.

Window Boxes are probably the best for growing plants in the schoolroom. The box should be about seven inches high and the width and length to fit the window. Cleats placed on the bottom will allow the air to circulate underneath the box. Holes must be bored in the bottom to allow for perfect drainage. If the boards show a tendency to warp, the box should be reinforced at the ends by nailing on strips of tin or zinc. The box should be painted before using, as the paint is a preventative against rot. The planning and construction of window boxes is an interesting and instructive diversion for the boys.

Ventilation is another important detail in plant culture. On all warm or bright days the window should be opened, preferably from the top because the foul air ascends. Discretion must be observed in cold weather, but one will soon learn to ventilate without injury to the plants.

Fertilizing Soil. It is a well known fact that soil becomes exhausted if plants are grown in it for a long time, and in order to keep the plants in a healthy condition the soil must be changed or food in some available form administered. Growing plants respond readily to manure steeped or soaked in water. Apply a

weak solution at first, gradually increasing the number of applications. Well-rotted cow manure may be mixed with the soil at the time of potting. Many of the commercial fertilizers are indispensible for some plants, but unless known they should be carefully used. Dried blood and bone meal are quickly available to the plant and contain an abundance of nitrogen. Kainit or German potash contains about twelve per cent of potash. Sheep manure also is excellent, but should be used sparingly. Such fertilizers may be procured from any first-class seedsman at a comparatively small expense. It should be remembered that plants in a flourishing or growing condition take up manure more rapidly than at any other time, but do not over feed.

Insufficient nourishment in the soil is often indicated by weak stems and yellow leaves. For class work nothing is more interesting than making various combinations of soils with different fertilizers and recording the result as compared with soils unfertilized.

Selecting Plants. The best plan upon which to build a collection of plants for window culture is to select plants that are known to endure the dry atmosphere of our schoolrooms. Plants with small stomata or leathery leaves possess this resisting power. The teacher, however, is usually obliged to confine her collection to the specimens brought by the students. It is well to know the names of the plants, also learn their native habitat, geographical distribution, and whether or not they possess any economic value. The teacher should encourage the students to visit the local florist, ask questions and discuss what they have learned in the class-room.

One of the best window plants is the geranium, but some varieties do better in the winter than others. The foliage of the rose-leaf geranium and fish geranium are sweet scented; they are easily grown in either a box or pot. The beautiful Lady Washington geranium does equally well, but must be given a rest during the summer months. Some of the fancy-leaved geraniums are excellent for foliage effects.

The bulbous plants are among the best for early winter blooming. They should be potted or boxed as soon as possible after purchasing, or stored in a cool place until wanted. After potting, the pots should be set in a cool, dark place until root-growth is well along, when they may be brought to the light. If the pots are

set in direct light immediately after potting, leaf growth will begin and become far advanced before the roots develop. The flower spike will also be short and imperfect, this is especially true of the hyacinths and tulips. If no cellar or cold frame is at hand, the pots may be placed close together out-of-doors and covered with a thin coating of chaff, and then about four inches of loam. If allowed to remain undisturbed until severe weather sets in, the loam may be removed with a pick or axe.

The paper white narcissus and the Chinese sacred lily are among the choicest of the bulbous plants. They may be easily grown either in soil or in bowls of water. Good effects may be secured by growing them in an aquarium. The buttercup oxalis, with its beautiful trusses of canary yellow flowers, is one of the earliest bulbs to grow. It does well as a basket plant. The culture of numerous other bulbs could be attempted with reasonable assurance of success. The amaryllis, calla and Easter lily, are magnificent.

The addition of vines to the window box is very effective. The English ivy succeeds in almost any situation. For light and favorable rooms the German ivy or the climbing nasturtium are excellent. A box of sweet peas planted in early autumn will give good results, and is excellent for class work.

Of the tropical foliage plants the following are among the best for house culture: Indian rubber plant, Chinese fan palm, sago palm, Aspidistra, rattan cane, paper reed, century plant, night-blooming cereus, Australian silk oak, umbrella plant, date palms. All the cacti are interesting and easily grown if carefully watered. The begonia, fuchsia, dwarf orange, lemon, wandering jew and Impatiens sultana should be grown if procurable. The Boston fern is probably the best fern for most windows.

The *insect enemies* to window plants are usually confined to a few species, all of which may be easily destroyed. For aphis or green fly, spray the foliage with an extract of tobacco stems steeped in water, applied weak at first and gradually increased in strength will soon eradicate fly. Mealy bugs may be washed from the plant or sprayed with fir-tree oil. If, however, a plant is very badly affected, it is better to throw it out entirely. Scales are often troublesome but may be checked by spraying with whale oil soap. When palms are affected the scales may be easily rubbed off with a wedged shaped piece of garden hose, or

the flayed end of a piece of cedar. Red spiders occasionally make their appearance if a dry atmosphere is maintained, but may be removed by spraying the plant with clear water forcibly applied through a hose or syringe. For the general health of the plants it is well to scrub the pots occasionally. Tobacco stems scattered about the pots for a few days will soon rid the plants of many unwelcome visitors.

While much more might be written on window plant culture, I have endeavored to bring out those points of special importance and to give some hint of an interesting field for experimental work in the school. The simplest exercise in soil making, potting or watering may arouse in the child a greater interest in plant lore, and the ultimate results may be far reaching.

THE NATURE-STUDY SITUATION IN ILLINOIS

By FRED L. CHARLES
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From what has appeared in THE NATURE-STUDY REVIEW and elsewhere it is apparent that in matters with which this publication is especially concerned conditions are practically the same throughout the country. The field has been cultivated more or less assiduously and often with disastrous results; but better methods are being introduced, a better understanding of the aims prevails, those who were proceding somewhat timidly though on a sound basis are becoming bolder, and every year able men are joining the ranks. At the Cleveland meeting of the N. E. A. last summer, in section programs, in the lobbies and at the meeting of the American Nature-Study Society the most striking feature to an interested observer was the number of university men of the first rank who are allying themselves with this movement.

This we believe to be a fair statement of the situation in Illinois today. Quoting from a paper by the present writer, read at the fifty-third annual meeting of the Illinois State Teachers' Association, in 1906, on "What has been accomplished by the Nature-Study Movement," "The advance line thrown out fifteen years ago comprised three groups of skirmishers: First, those whose aim invariably was too high, who overshot the mark; second, those who in the midst of battle found themselves devoid of

ammunition; third, here and there a sharpshooter who did valiant service. With this unorganized and ill-formed skirmish line defeat was inevitable. A retreat was ordered. The lines are now reforming; there is a better understanding of the purpose of the assault. There is more bullet and less powder. We are all but ready for the forward movement, but as the bugle sounds, may we plunge into the fray well armed and fully comprehending the plan of the campaign."

It may not be unbecoming to note that Illinois, agriculturally, grants precedence to no other State. Producing 300,000,000 bushels of corn, she is growing men who can handle corn intelligently. With Hopkins and others blazing the way, with Dean Davenport directing a large corps of investigators and himself spreading the gospel of education for efficiency, with Hall, Farr, Barto and many others at work in the Farmers' Institutes and a progressive body of land owners throughout the state, agriculture is fast assuming the aspect of a profession. The University of Illinois through its School of Agriculture is initiating young men into the secrets of the soil and in increasing numbers these trained men are returning to the farms.

The State has had its quota of advanced workers in the nature-study movement. Jackman stood as a foremost leader, coming from Pittsburg to Chicago to ally himself with the forces under Colonel Parker. A host of others have been worthy contributors to the cause—Forbes, Colton, Coulter, McMurry, Caldwell, Kern, Mann, are but a few names which come to mind. In the normal schools, in the high schools and in very many elementary schools are found teachers in whose hands nature-study values do not suffer. Many college and university men are contributing generously to the popularization of science. A State commission of educators, through the initiative of Governor Deneen, is engaged in the work of codifying the school laws and studying the entire educational system with a view to recommending needed changes. The movement toward agriculture, manual arts and industrial education in general is very marked.

We are fortunate in securing for this number of THE REVIEW articles from State Superintendent Blair and Dean Davenport. Mr. Blair is devoting himself with untiring energy and enthusiasm to the betterment of the school system, and has not overlooked the needs of the country schools. One of his innvoations last fall

was a proclamation appointing Friday, November 6, as Corn Carnival Day in all the country schools of the State, and Friday, November 13, as Corn Exhibition Day, to be held, if possible, in the office of the county superintendent of each county. With the opportunity which he has of viewing the work of the entire State his paper estimating present conditions is of much interest. Dean Davenport has been attracting much attention of late through his masterly addresses on the subject of industrial education and education for efficiency. His views on the subject of special agricultural high schools are well known. His statement of values in nature-study and agriculture should be especially suggestive to all workers in these fields.

In company with a county superintendent the writer has recently visited a number of one-room rural schools. Driving an automobile which over fair roads made a mile in two minutes we were able to enter seven schools during the day and to witness actual work in three of them. With about 150 such schools scattered over a large county, with endless details of office work to attend to, to say nothing of the graded schools of the county, the personal visitation of the isolated school by the county superintendent is at best infrequent. In fact, a visit from anyone is a rare event. Many directors never visit the school. The only assistance or guidance afforded the inexperienced and untrained teacher (whose name is legion) is found in the few hurried words of the visiting county superintendent. The service rendered by this official, devoted to his calling and the possibilities for good in the way of correction, counsel, admonition or encouragement can scarcely be overestimated.

A number of county superintendents of Illinois who are known to be actively interested in the problems of the rural school were asked to contribute brief statements of the situation in nature-study and agriculture in their respective territories. Some failed to reply, but the following may be taken as typical:

Co. Supt. Cyrus Grove, of Stephenson County, writes: "In an elementary way we have been endeavoring to study nature instead of studying about nature. Agriculture in the schools is no longer a vague hope, but a present reality. Nature's practical book has remained sealed only too long." He directs his teachers to do as a minimum the work in agriculture as outlined in the State course of study. In the semi-annual examinations given

throughout his county the pupils from first grade up are examined in rudiments of agricultural lore.

Co. Supt. B. C. Moore, of McLean County, writes: "Most of our schools do something along the lines of nature-study and agriculture. The aim is not very clear in the minds of many teachers, but some very good results are obtained. It is observed that pupils are made more observant, more interested in the ethical and practical phases of their environment and become better thinkers. The communities for the most part support the work 'because the teacher wants it so' and because the children are interested. They scarcely see the meaning. In some instances, however, parents actually object to nature-study and agriculture. Teachers generally are not well prepared for the work, either from the standpoint of knowledge or method. The present trend is for the teaching of these things, and the needs are for prepared teachers and some good nature-study courses that will outline good material, not all to be done, which will be general and pedagogical in its nature."

Co. Supt. G. W. Conn, Jr., of McHenry County, writes: "There has been a marked increase in the interest in out-door art, agriculture, nature-study, and the general improvement of rural conditions in McHenry County in the last few years. This manifestation of a deeper sympathy for nature and its improved forms is due to several different causes.

"The Farmer's County Institute has been a potent factor in the awakening. However, this has been greatly strengthened by the County Federation of Rural Forces, an organization that unites the forces of seven or eight distinct county organizations. This association in its efforts to bring about "a greater symmetry and higher form of rural community life" has stimulated the public consciousness along the lines of scientific agriculture, out-door art, household arts and nature-study that is economic, aesthetic and humanitarian.

"Farmer's clubs have been formed that hold several local institutes during the year. These are probably the most effective of any of our local organizations in promoting all of the afore mentioned lines of interests as well as inducing a higher type of institutional life for the country neighborhood. The Riley Country Club stands out preeminent in its successful undertakings and in its

unique method of working and organizing its forces. These clubs promise much for the future.

"Work among the young people of the county who are largely residents of the farming districts has not been wholly desultory in its character. Corn contests have been held. Three country schools have done some work with the Babcock tester. This aroused unusual interest among the farmers who are patrons ot the country schools. It touched the home on the economic side, this being a dairy county, and established a strong point of contact between the school and the home. The introduction of that phase of agriculture into the schools that has closest economic reference to the community life cultivates a school sentiment that will not only "permit" the general study to be introduced into the country school, but will demand its introduction.

"A Dairy JudgingContest was held in one community last spring. The school lasted for two days. During this time the boys, and the girls too, received instruction from a University man on the characteristics of a good dairy cow. The third day was devoted to the contest. Thirty-two contestants enrolled, twenty-four boys and eight girls and a high school girl won. She will be given her expenses to the short term of the University during the coming winter. We are planning two more contests.

"The school teachers of the county have not been idle. They have done the best they could with the time and equipment at hand. Sewing has been taught in the schools. Household arts has received some attention. Agriculture, as stated before, has been attempted with some degree of success. One of our city systems, Marengo, has introduced this subject into its eighth grade for the coming year. School-gardens have been planted and tended in many schools of the county for the past four or five years. This fall, though the ground is dry for five feet below the surface, the county superintendent in his visitations has seen several flower beds in school yards with the flowers still blooming, and in two instances the yards were unfenced. This indicates initiative and perseverance on the part of the teachers.

"On the whole we feel that we are doing some things that need to be done and that our county is better for the doing."

Co. Supt. O. J. Kern, of Winnebago County, is known throughout the country for his advanced stand for the country school. Consolidation of rural schools, beautifying buildings, rooms and

grounds, boys' clubs, libraries, etc., are among the interests which he has been instrumental in promoting. He publishes annually a report of the Winnebago County Schools which is richly illustrated and filled with data and suggestions for all who are interested in the improvement of rural schools and the amelioration of country conditions.

Physiology in Illinois Elementary Schools.

A presentation of the situation in Illinois would be incomplete without reference to the matter of "scientific temperance instruction." A bill passed in 1897 through the efforts of the W.C.T.U. prescribes that "the nature of alcoholic drinks and other narcotics and their effects on the human system" shall be taught every year for ten weeks in every grade below the second year of the high school (three lessons per week in primary grades and four lessons per week in all others), from text-books in the hands of the pupils (except in primary grades, where the teacher shall teach from such texts), said text-books to give "at least one-fifth their space to the nature and effects of alcoholic drinks and narcotics." Pages in a separate chapter at the end of the book are not to be counted, and high-school texts "shall give not less than twenty pages" to the drink and narcotic feature.

This law, still in force with suitable fines attached, has been severely attacked and warmly defended. Finally, at its 1906 meeting, the State Teachers' Association appointed a committee of six representative school men to confer with a similar committee from the Illinois W. C. T. U. to consider and recommend changes in the statutes governing the teaching of physiology and hygiene. As brought out in the meetings of this joint committee, the present law is objectionable for several reasons—as is doubtless patent to teachers who read this statement. Literal compliance with the law is rarely met with; open violation is common; many high schools graduate pupils with no instruction in physiology—a fact to be deplored.

Much good was accomplished through the meetings of the joint committee. However, no result was reached, as it developed that the W. C. T. U. committee was appointed to confer, but not to concur in recommending any change in the law. At the 1907 meeting of the State Teachers' Association its committee reported, recommending changes in the law. The committee was

continued, with instructions to present the proposed bill to the legislature. It is assumed that this bill will come before the session of the legislature this winter. The Illinois W. C. T. U. is opposed to any change in the law, being satisfied with the present statute and fearing that to bring the matter before the legislature may endanger the existing provision.

It is indeed unfortunate that two bodies of earnest workers in a common cause should differ so radically in their convictions. It would seem that methods of instruction should be determined by authorities in pedagogy rather than by laymen, just as medical treatment is determined by the physician. No one objects to the state passing upon the qualifications of a candidate for the medical profession, but, once qualified, he should resent dictation as to his mode of procedure in a given case. This is met by the argument that without legal enforcement the subject of temperance is neglected.

It is simple justice to state that many members of the Illinois W. C. T. U., including some of the State officers, sympathize with the contention of the teachers' committee and grant the validity of the arguments against the present statute. On the other hand, certain activities so clearly indicate the attitude of at least some who wear the white ribbon that it may be worth while to let the facts be known.

Since the publication of the report of the Committee on Physiology* of the Illinois State Teachers' Association, the members of that committee have been in receipt of a number of communications from ministerial associations throughout the State protesting against any change in the present law. Courteous replies to these and inquiries concerning the basis of action has revealed the fact that many if not all of these protests were prompted by an appeal from Miss Marie Brehm, then vice-president of the Illinois W. C. T. U., and that in at least a portion of these cases—if not all—the action was voted without any hearing or investigation of the teachers' side of the argument. Later (in May, 1908, A. D.!) the following petition appeared and was given circulation through the State by members of the women's organization.

*This may be obtained from J. E. Armstrong, Englewood High School, Chicago.

While its sources are understood, be it said that it did not emanate from the State headquarters. The document reads:

To the President and Members of the Board of Trustees of Northwestern University, Evanston, Illinois:

Whereas, the name of Professor G. A. Coe, of Northwestern University, appears in the list of members of a teacher's committee which propose to ask the Illinois legislature to repeal the law requiring instruction in the public schools of the State in Physiology and Hygiene with special reference to the nature and effect of alcoholic liquors upon the human system. We, the undersigned members of the Methodist Episcopal Church hereby enter our protest against the use of an institution so conspicuously identified with Methodism as Northwestern University, or any of its professors or representatives, for the purpose of depriving the children in the public schools of Illinois of the law which provides for their instruction against the great evils of alcoholic liquors and other narcotics.

We demand the withdrawal of the name of Professor Coe from such effort, or his resignation from the faculty, for we cannot conscientiously send our children to Northwestern University or recommend the institution to others for the education of their children unless this stigma on our *temperance principles* is removed.

Such a document savors of the middle ages or the inquisition. To the credit of the State president, Mrs. Mary E. Kuhl, the following was issued immediately from State headquarters:

BULLETIN No. 4

MOST IMPORTANT

Dear Comrades:

A circular letter, with a petition to be circulated against Professor Coe, of Northwestern University, one of the members of the Committee of Educators appointed to confer with us, has been sent out to the several unions of the State.

Said letter and petition are *unofficial* and *unauthorized*, nor has such petition or such action ever been ordered by the State W. C. T. U.

Our mid-year executive body did order that a committee of one hundred leading educators of the State be asked to make care-

ful investigation of our Scientific Temperance Instruction Law relative to its merits. Said investigation has been going on with profit, and results in most cases, for the retention of our law by the several parties.

The Illinois W. C. T. U., stands for the present law without any change, but to circulate a petition against any one member of a duly appointed committee is most unwise, unjust and uncalled for, it is a drastic measure which certainly cannot be approved by our white-ribboners.

Therefore, as State President, I herewith urge our women not to circulate said petition for it will work untold harm to our cause.

MARY E. KUHL,
Chicago, May 20, 1908. *President of Illinois W. C. T. U.*

Two days later appeared the following rejoinder, which only too plainly verifies our worst suspicions as to the animus of those who are crying for an operation to remove this "stigma" from their "temperance principles."

To the Local Unions of Cook County:

CHICAGO, May 22, 1908.

Dear Co-Workers:

Upon my return home last night, I was informed that our County President, Mrs. Emily Hill, had called me over the telephone for an immediate interview. This morning I responded to the emergency call before breakfast. The occasion of the call was a Bulletin issued by our State President, Mrs. Kuhl, calling attention to the circulation of a remonstrance among Methodist people. Your union has doubtless received Bulletin No. 4, so you know *to what I refer*. As County Superintendent of the Scientific Temperance Instruction department, I wish to call your attention to the fact that this remonstrance is a *Methodist document* circulated and signed by *Methodist people*, urging the recall of Prof. Coe's name from the list of the Teacher's Committee, which is urging the repeal of our state law requiring instruction in Physiology and Hygiene, etc.

Another item to consider is that this law is a State Law, for the instruction of all the school children who are being educated at the expense of the *State*, and any group of people has a right to protest against the use of any of its representatives or institutions

being used to repeal a law which is so beneficent in its requirements, and so necessary for the salvation of the people of Illinois from the burdens and iniquities of the liquor traffic.

Mrs. Hill does not pretend to send this petition referring to Prof. Coe as an official W. C. T. U. document, but is sending it as a representative and at the expense of Methodist people, and *not* at the expense of the Cook County W. C. T. U. treasury. Personally, were I a Methodist, I would consider it a privilege to sign my name to such a document, for the great Methodist church has a world-wide reputation for its pronounced stand on the Temperance question.

It is to be regretted that a representative of its most famous educational institution, in Miss Willard's own town of Evanston, should have allowed his name to be used in connection with the attack on our S. T. I. law, particularly in view of the fact that the law does not affect him as an educator.

As County Supt. of S. T. I. work, I rejoice that the battle is reaching beyond the circle of the W. C. T. U., not only in Cook County but all over the State of Illinois, and is enlisting the activities and influences of the religious denominations and temperance people of the entire State. Urging your most earnest co-operation for the retention and preservation of the law, and with faith for victory, I am,

Hopefully yours in White Ribbon bonds,

MARIE C. BREHM,

Cook County Supt. of S. T. I.

While such sentiments as the above are not shared by all members of the W. C. T. U., it cannot be denied that the dissemination of such literature has its prejudicial effect upon local unions generally.

The Illinois Watch Tower, published in the interest of the Illinois W. C. T. U., in its issue of March, 1908, devotes much space to a discussion of scientific temperance instruction and a comparison of the present law with the proposed bill. For anyone who wishes to familiarize himself thoroughly with the nature of the W. C. T. U. argument the reading of this issue of the *Watch Tower* is recommended.

It now appears that a petition has been circulated in Chicago calling upon the Board of Education of that city to remove from

office (or from pernicious activity in attempting to improve the method of instruction in hygiene) Principal J. E. Armstrong, of the Englewood High School, Chicago, chairman of the State teachers' committee.

Local option has carried in a large portion of our Illinois territory and if the movement continues it may be that this "scientific" bone of contention may be snatched from the contestants by an awakened citizenship.

MANAGING EDITOR'S NOTES

A Correction: In making up the page proof of the November issue the last paragraph on page 250 was displaced from Professor Coulter's discussion on page 251.

Directory of Members of A. N. S. S. has been delayed because of new members added to 1908 list and many changes. It will be supplementary to the January or February number of this magazine.

Index to Vol. 4 will be mailed with January or February number.

Index to Vol. IV, 1908

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